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ALEXANDER TWEEDIE, M.D. F.R.S.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS,
PHYSICIAN TO THE LONDON FEVER HOSPITAL AND TO THE
FOUNDLING HOSPITAL, ETC.

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A
SYSTEM
OF
PRACTICAL MEDICINE

COMPRISED IN
A SERIES OF ORIGINAL DISSERTATIONS.

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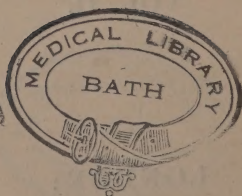
SYSTEM
OF
PRACTICAL MEDICINE

A REVIEW OF ORIGINAL DISSECTIONS

PERFORMED AND REPORTED BY

ALEXANDER TRENK, M.D.

OF THE UNIVERSITY OF WISCONSIN, AND OF THE
HOSPITALS OF THAT STATE, IN THE CITY OF MADISON.



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BEFORE entering upon the description of diseases of the nervous system, there are certain considerations of a general nature, applicable to the whole class, the discussion of which in this place will prevent much unnecessary repetition.

It is evident that as disease consists in the derangement of those functions the proper performance of which constitutes what is termed health, it is necessary that the physician should be as intimately acquainted with the latter as with the former. To the union of scientific with practical knowledge may be attributed the great advances which have been latterly made in the study of the nervous system; as it is an undoubted fact that the mysterious functions of this portion of the animal structure have been principally elucidated by the labours of those who have had extensive opportunities of proving the accuracy of their opinions by clinical observation. Indeed it must be obvious that anatomical, physiological, and pathological researches bear a mutual relation to each other; and as experience has shown that, prosecuted by themselves, they are inadequate to the end in view, modern physiologists unite the results which these have respectively elicited, and thus endeavour to correct the numerous fallacies which are likely to result from confining the attention too exclusively to one department or the other. The inquiries that have been carried on in this way have made it necessary to view the nervous system in a very different light from that in which it was formerly considered; and that we may place before the reader the present state of knowledge of this subject in as condensed a manner as possible, we shall, first, consider its general anatomy; secondly, its physiology, and, lastly, its pathology.

I. The nervous system is composed of two structures; the granular or grey, and the fibrous or white. The former is more vascular than the latter, a fact fully established by the injections of Ruysch and the microscopical examinations of Lewenhoeck. In the grey matter, according to the researches of Ehrenberg, there is mingled with a soft granular substance a number of minute corpuscles, which are strung on filaments like beads, and which become distinctly fibrous in the neighbourhood of the medullary substance. The white matter, on the contrary, is not granular, but tubular, consisting wholly of tubes, which, in the brain and spinal cord, contain a transparent gelatinous fluid. They are from $\frac{1}{50}$ to $\frac{1}{3000}$ part of a line in diameter, of an ampullated form arranged in parallel lines; and in the brain are larger towards the base, and in the spinal marrow towards the external surface. The first, second, and auditory nerves consist of similar tubes; but in the spinal nerves generally the tubes are of a cylindrical form, are larger than the others, and contain a peculiar granular matter, which may be squeezed out of them. The sympathetic nerves are formed of both kinds of tubes; and in the ganglions is superadded the same granular structure as is found in the grey matter of the brain.

The grey and white matter are arranged differently in the brain and spinal

cord. By the brain we understand all that part of the encephalon situated above the corpora quadrigemina; and here the cineritious substance is placed external to the white, and covers the surface of the cerebral hemispheres, which, by its numerous infractions and convolutions, allows a large quantity of this material to be contained in a small space. In the spinal cord, however, which includes not only that portion in the vertebral canal, but all that part of the cerebrum below the corpora quadrigemina, the grey matter is internal, surrounded by the white, — an arrangement which permits the latter to extend in the form of nerves to all parts of the animal frame. In the superior or cranial portion of the cord, the grey matter is collected in masses, as in the corpora striata, thalami nervorum opticorum, &c. through which medullary fibres pass forming ganglia; but in its inferior or vertebral portion it is continuous, somewhat in the form of the letter X, the prolongations of which constitute its anterior and posterior peaks or cornua.

The medullary matter in the spinal cord may be divided into six columns, three being contained in each symmetrical half of the cord. The anterior column includes the part enclosed between the anterior longitudinal groove and the anterior cornu of the grey matter; the middle column is placed between the two lateral cornua of the grey matter, and the posterior column between the posterior cornu of the grey matter and the posterior longitudinal groove. These different columns maintain a uniform relation to each other in that part of the spinal cord enclosed within the vertebral canal, the fibres of which they are composed being arranged in vertical lines. In the medulla oblongata, however, while the greatest number of the fibres in the anterior columns continue upwards through the pons varolii to form the *crura cerebri*, and ultimately proceed to the cerebral convolutions, some decussate with their fellows on the opposite side, as they approach the corpora pyramidalia; and others, as shown by Mr. Solly, pass outwards below the olivary bodies to join the posterior columns and accompany it into the cerebellum. The middle columns also decussate in the medulla oblongata, as lately shown by Sir Charles Bell, but instead of passing through the corpora striata, traverse the optic thalami, to become expanded in the hemispheres. The posterior columns, on the other hand, diverge from each other without any decussation, and proceed upwards and outwards to assist in forming the *crura cerebelli*, and are lost in the cerebellum. The anterior motiferous roots of the spinal nerves are connected with the anterior columns and anterior peaks of the grey matter, while the posterior or sensiferous roots are connected with the middle columns and posterior peaks of grey matter. The medullary matter in the brain is composed partly of the fibres which are continuous with the columns of the spinal cord, called the diverging fibres, and partly by others which connect them together. Some of these cross those just described transversely, forming the commissures, the corpus callosum, &c., while others run from before backwards, forming the fornix, processus a cerebello ad testes, &c.

II. The great difference in structure and peculiar arrangement of the two component portions of the nervous mass lead to the idea that they perform different functions; and it is an opinion held by many physiologists, and daily gaining ground, that the grey matter is the originator of nervous power, while the office of the medullary fibres is to act as conductors, conveying to the cineritious or grey matter the influence of impressions communicated to these fibres, and conducting outwards from the grey substance the mental and motive influences to distant organs.

Anatomists and physiologists have disputed whether the spinal cord is to be considered as a prolongation of the brain, or the brain as an expansion of the spinal cord; but it is now admitted that, when viewed physiologically, they ought to be regarded as two distinct organs, capable of performing functions independent of each other, although the action of both at the same time gives rise to results which partake of a mixed character. Thus numerous facts demonstrate that the brain furnishes the conditions necessary for mental acts, while

the spinal cord possesses those essential for the manifestation of motion. We have seen, however, that there is an anatomical connection between the brain and spinal cord, and in their normal state one may influence the other so that the two functions may be called into action simultaneously, giving rise to results which partake of both, yet resemble neither alone. The functions of the central organs of the nervous system therefore may be divided into those furnished by the brain, those furnished by the spinal cord, and such as result from the action of both. These may be named the cerebral, spinal, and cerebro-spinal functions, each of which we shall consider in succession.

1. The brain furnishes the conditions necessary for the manifestation of the intellectual faculties, properly so called, of the emotions and passions of volition; and is essential to sensation. Taking into consideration what has already been said concerning the offices of the grey and white matter, there are many reasons for supposing that mental acts originate in the former, a supposition which is rendered probable by the following facts:— 1. In the animal kingdom generally, a correspondence is observed between the cortical substance, depth of convolutions, &c. and the sagacity of the animal. 2. At birth the cortical substance is very defective, being only marked out by superficial fissures almost confined to the surface of the brain; as this substance increases, the intelligence becomes developed. 3. The results of experiments by Flourens, Rolando, and others, have shown that, on slicing away the brain, the animal becomes more dull and stupid in proportion to the quantity of cortical substance removed. 4. Foville, Delaye, Pinel, Grandchamp, Bouillard, and Davidson, by an unusual degree of accuracy in pathological investigation, were generally enabled to detect morbid alterations of the cortical substance in cases of insanity; that is, by employing a degree of care which renders it probable that many cases recorded by writers where no alteration was discovered, depended upon the unskilfulness of their attempts to demonstrate it. 5. An observation of the symptoms in those cases in which the structural alteration has been afterwards found to commence at the circumference of the brain and proceed towards the centre, shows that the mental faculties are those among the first affected; whereas in those diseases in which the lesion commences at the base of the organ and proceeds towards the circumference, they are affected last. If such be the office of the grey matter, the fibres of the white matter in the brain must serve to conduct the mental impressions made on their extremities; and it may be asked whether the fibres so minutely described by Reil, running transversely, and from before backwards, and which connect anatomically different portions of the cortical substance of the brain, are not subservient to that combination of the intellectual faculties which characterises thought. But whatever opinions are held regarding the office of these two sets of fibres, there can be no doubt that some of the diverging fibres carry the influence caused by volition to the spinal marrow, and others the influence of impressions made on the sensitive nerves upwards towards the grey matter. Of the use of these fibres, however, we shall speak when treating of cerebro-spinal actions.

2. The spinal cord furnishes the conditions necessary for combined movements; and that the nervous energy requisite for these movements originates in the grey matter, is rendered probable by the following facts:— 1. Its universal communication with all motor nerves. 2. Its increased quantity in those portions of the spinal cord from whence issue the large nervous trunks. 3. Its collection in masses at the origin of such nerves in the lower animals as furnish peculiar organs which require a large quantity of nervous power, as in the *Triglia Volitans*, *Raja Torpedo*, *Silurus*, &c. In the spinal cord also the white matter serves as a conductor, and is the agent by which not only the influence of impressions made on the nerves reach the grey matter, but by which the changes these occasion there, are transmitted outwards to act on the muscles. From the researches of Sir C. Bell it appears most probable that the first office is performed by the fibres which constitute the middle or sensi-

tive columns, and that the last is the peculiar function of the anterior or motor columns. In the present state of our knowledge it is difficult to determine the exact uses of the posterior columns. Before proceeding further, however, it will be necessary to distinguish the different kinds of motion performed by the animal frame from each other.

The instruments of all motion in animal bodies are the muscles, which the researches of Haller have proved to possess a certain property he named irritability, but which has since received the more appropriate name of contractility. This property, by means of which the muscles are thrown into action on the application of certain stimuli, does not appear to be necessarily connected with the nervous system, and hence a class of movements may be induced independent of the brain or spinal cord. But this property may also be called into action by the influence of stimuli, which may be applied through the medium of the nervous filaments connected with the anterior column of the spinal cord. These stimuli may be classed under two heads, those of volition and mental emotions, and those of chemical or mechanical agents. Thus there are three kinds of movements:—1. Those which depend on the application of a stimulus to the muscular fibre itself, independent of the brain or spinal cord. 2. Those which depend on this stimulus being conveyed to the muscular fibre through the agency of the brain and spinal cord combined. And, 3. Those which are called into action only through the medium of the spinal cord. Of the second class we shall speak when considering the cerebro-spinal functions, and here describe only the last or spinal movements.

The third class of movements which we have mentioned have been for the most part elucidated and separated from the others by the labours of Dr. M. Hall, who has termed them excito-motory. They include all those co-ordinate motions engaged in the organic functions of the body, such as sucking, swallowing, respiration, the emission of certain sounds, &c.; the action of some of the spinal muscles, and the abnormal movements constituting convulsions or spasms.

These movements result from certain excitations applied to particular organs of the body, and are effected in the following manner:—1. A change (which, for want of a better name, we call an impression) is made upon some of the expanded nervous filaments which are connected with the sensitive columns of the spinal cord either in its vertebral or cranial portion. 2. This impression is conveyed inwards either to the vertebral or cranial portion of the cord. 3. An influence is generated in the cord and transmitted outwards along the filaments connected with the anterior or motor columns. And, 4. This influence stimulates the muscular fibres to contract. Thus sucking in the infant depends, 1. upon certain impressions having been made on the filaments of the larger root of the fifth pair expanded upon the mucous membrane of the mouth. 2. These impressions are conveyed by these filaments of the fifth pair to the medulla oblongata. 3. An influence is there generated, and is transmitted outwards along the motor nerves distributed to certain muscles of the face, throat, and chest. 4. This influence stimulates these muscles to contract. In the same manner respiration is habitually performed by certain impressions made principally upon the filaments of the par vagum distributed to the lungs, and to a less extent upon the filaments of the fifth pair, and posterior roots of the other spinal nerves, ramifying on the skin of the face and other parts of the body, while the influence the impressions give rise to in the medulla oblongata is transmitted outwards by the phrenic, intercostal, and other motiferous nerves distributed to the respiratory muscles, which are stimulated into simultaneous contraction. It has been fully ascertained, both from observations made upon anencephalous fetuses of the human species, by experiments upon the lower animals, and by the fact that they continue when the functions of the brain are suspended in disease, that none of the parts of the encephalon above the corpora quadrigemina are necessarily engaged in the performance of these actions, and that the corpora quadrigemina, tuber

annulare, medulla oblongata, vertebral portion of the spinal cord, and the various nerves attached to these different parts, are the only portions of the nervous system essential to their performance. These movements, however, although essentially spinal, are to a certain degree placed under the dominion of the brain; an apparent contradiction, which we shall now proceed to explain.

3. We have previously stated that a third class of functions result from the combined action of the brain and spinal cord. We have stated that the function of the brain may be said to consist in furnishing the conditions necessary for intelligence or mental acts, — a function which may exist without the power of motion; and that, on the other hand, the spinal cord furnishes the conditions necessary for combined movements, a function which may exist without intelligence. In the one case a certain integrity of the brain is necessary, and in the other a certain integrity of the spinal cord. There are, however, some motions which can only be produced through the agency of the brain, and some mental operations which can only take place through the agency of the spinal cord; and the difficulty of analysing the different motions which occur, and the nature of the mental operations which accompany them, is what hitherto has given rise to so much confusion. We hope, however, that the method we have adopted of considering this subject will in a great degree dispel the obscurity which has hitherto surrounded it.

The class of motions which are produced by mental acts are of two kinds — 1. those resulting from an exercise of volition; and, 2. those occasioned by the emotions or passions. When the muscles of the trunk or limbs are thrown into contractions by an act of volition, it is effected in the following manner: — 1. The mental act of volition takes place in the brain. 2. This produces an influence which is transmitted downwards along some of the diverging (or in this sense converging) fibres of the brain, the anterior column of the spinal cord, and the nerves leading from it to the muscles to be moved. 3. This influence acts as an excitant to the property of contractility inherent in the muscular bundles by which they are called into contraction. Hence if the brain be incapable of performing the mental act of volition, or if the spinal cord be incapable of transmitting the influence it gives rise to, loss of voluntary motion is the result. This, however, may be partial; and then it may not only depend on partial disease of the brain or spinal cord, but on the abnormal condition of one or more nerves which transmit the influence produced, or a loss of the property of contractility in a greater or less number of muscles. As the muscles which perform the excito-motory actions also contract either habitually or occasionally from the stimulus of volition, these movements may be considerably controlled by the mind. Thus a strong exercise of the will may suppress or diminish their force, while many of them appear to be most perfect after the suspension of the functions of the brain. The mind is also capable of exciting an occasional influence over the muscles of organic life, as is well illustrated by the increased or diminished action of the heart from anger or fear. The particular nerves subservient to these motions, or the manner in which they are produced, is still unknown.

We now speak of those mental operations which are excited through the necessary agency of the spinal cord, viz. sensations. We apply the term sensation to certain changes with which we are familiar, and which are attended with consciousness. Some physiologists have extended this term to various changes not attended with consciousness; but such vagueness of expression cannot be too carefully avoided. When a sensation is created from an impression made upon any of the organs of the body, as when the rays of light fall upon the retina, it is effected in the following manner: — 1. An impression is produced on the expanded filaments of the optic nerve. 2. The influence of this impression is conveyed by the trunk of the optic nerve to the brain, and carried upwards by means of some of the diverging fibres. 3. Some change is produced in the brain (most probably in the grey matter) of which the mind becomes conscious; or, in other words, a sensation is felt. The property pos-

sessed by certain nerves of receiving those impressions which excite sensation, is generally termed sensibility. The impressions so made pass along the sensiferous nerves, and are conveyed upwards to the brain by the middle columns of the spinal marrow; and if we are conscious of these impressions, sensation is produced. This sensation, when once excited, may suggest various circumstances connected with the properties and relations of the objects of the external world, by which the impression is caused; and this constitutes perception. For the existence of sensation, therefore, it is necessary, 1. that the expansion of the nervous filaments should possess sensibility; 2. that the fibres in the nerves and spinal marrow should be enabled to transmit impressions; and lastly, that the mind should become conscious of such impressions. It is obvious, therefore, that however we may be led to refer the sensation felt to the extended filaments of the nerves upon which the impression has been made, yet this sensation actually takes place in the brain. As it is only by motion, however, that we are enabled to detect the existence of sensation in others, it was for a long time supposed that the movements in decapitated animals, which often resemble those dictated by volition, were connected with sensation. But by adopting this opinion, it is necessary to admit two centres of sensation; a view which the writings of Le Gallois tended principally to inculcate, but the fallacy of which is apparent when we metaphysically examine our own thoughts. Every one feels internally convinced that when he is sensible of an impression, he must be conscious of it, and at once sees the absurdity of supposing that an animal can be conscious of an impression, when the brain, in which the intellectual faculties reside, is removed. These various actions, therefore, must depend upon circumstances distinct from the possession of sensation and volition, and, as we have before explained, are purely spinal.

From what has been said it appears that two sets of medullary fibres are capable of transmitting two nervous influences in different directions. That originating in the brain from volition is transmitted *downwards* to the muscles to produce motion, and that originating in the expanded filaments of the nerves is transmitted *upwards* to produce sensation.

In connection with this subject it may be necessary to remark, that impressions made upon the different sensiferous nerves are not capable of exciting all the various kinds of sensation indiscriminately. Thus it has been proved that impressions made upon the optic nerve can only excite one kind of sensation—that of light. When the retina is pricked or torn, a sensation of a flash of light is experienced, but no pain. It has also been shown that although the brain is the seat of sensation, yet its substance may be cut, torn, or burned, without producing any indication of suffering, or any convulsive movement; proving that however capable the medullary fibres may be of transmitting the influence of sensitive impressions, they cannot originate them. It is only when injuries of the encephalon extend down to the cranial portion of the spinal cord, that pain or convulsions are excited; proving the difference in function of these two parts of the encephalon.

From what has preceded it appears that we are enabled physiologically to separate with tolerable distinctness the functions of the brain and spinal cord, and in those which depend upon both refer to each the part it respectively performs in their manifestation. Thus the brain, acting alone furnishes the conditions necessary for intelligence; the spinal cord acting alone furnishes the conditions necessary for the co-ordinate movements necessary to the vital functions; and the brain and spinal cord acting together furnish the conditions necessary for voluntary motion and sensation.

Before concluding this sketch of the physiology of the nervous system, it is necessary to allude more particularly to that class of movements which appear habitually to be independent of nerves, and yet are occasionally influenced through them. We allude to the continued movements of the heart, the peristaltic actions of the stomach and intestines, &c.

The Hallerian doctrine concerning muscular contractility appears to be the

one most consistent with facts; namely, that this property is inherent in the muscular fibre itself, and is not necessarily called into action through the medium of the nervous system, but only by the application of an appropriate stimulus to the muscular fibres themselves. Thus the blood which flows into the cavities of the heart is the natural and habitual excitant of that organ; while the muscular fibres of the intestines are called into contraction by the direct excitation of the ingesta contained in their interior. The experiments of Le Gallois and Dr. W. Philip, however, have shown that sudden extensive injuries either of the spinal cord or brain destroy the contractility of the heart, and bring the circulation to a stand; while, on the other hand, both these organs may be removed or gradually destroyed without arresting the heart's action, provided artificial respiration be maintained. It has been further proved by Dr. W. Philip, that injuries inflicted upon the substance of the brain, though not sufficiently extensive to arrest or even materially impair the contractility of the heart, may yet prove rapidly fatal by destroying the functions of the medulla oblongata, and consequently arresting the respiration. It has also been shown that extensive injuries inflicted upon any part of the nervous system, as when a limb is severely crushed, will seriously impair the contractility of the heart. These facts, however difficult they may be to explain, are of the greatest value in the study of disease.

III. There are certain circumstances in the animal economy which must always be taken into consideration before we attempt to reason correctly on nervous affections. The most important of these is the nature of the circulation within the cranium. The brain is circumstanced very differently from any other organ: in a state of health it entirely fills an unyielding case of bone, by means of which, all atmospheric pressure, or any other disturbing cause is prevented, except such as is communicated through the blood-vessels, which enter it. No doubt can exist that the substance of the brain is incompressible by any force that can be conveyed to it from the heart through the arteries; and it is impossible that the quantity of blood circulating in the vessels can be materially increased, unless something give way to make room for the additional quantity; and in the same manner the amount of blood cannot be diminished unless something enter to supply the place which had become vacant. The quantity of blood, therefore, circulating in the brain in a state of health is always exactly the same, and distributed in certain proportions between the arterial and venous vessels. These views, which have been ably advocated by Dr. Abercrombie, result from the experiments of Kellie, Monro, and Carson, who found that in animals bled to death, although every other part of the body was blanched, the brain alone retained its normal quantity of blood; but when an opening was made into the cranium, so as to place its contents in the same relation to atmospheric pressure as other organs, it became blanched in the same manner. The work of Dr. Abercrombie offers so many arguments in favour of this view as to render it extremely probable that a healthy state of the brain depends, as he expresses it, upon a just proportion of blood being maintained in the arteries and veins distributed through its substance. But when this equilibrium is deranged, it appears evident that pressure is produced on some part of the brain, for although the organ itself is incompressible, the numerous vessels which traverse it would, under such circumstances, be differently acted on; the calibre of some would be diminished, and that of others increased, and the dilatation of the latter would necessarily induce the exercise of an unaccustomed degree of pressure on the nervous tissue with which they were in contact. As far as the explanation of morbid phenomena therefore is concerned, the terms "change of circulation within the cranium" and "pressure on the brain" are synonymous, as the one cannot take place without the other.

Another circumstance to be alluded to is, that the functions of the brain and spinal cord, although different in their nature and effects, are similarly connected with those portions of the nervous system which furnish the con-

ditions necessary for their manifestation. They are all capable of being perverted, increased or diminished by the same external or internal stimuli, or by the same morbid actions. Thus the too long continued application of a stimulus produces irritation; this causes excitement of the part to which it is applied, and the effect is an exaltation of the function dependent on that part. If, on the other hand, instead of irritation, destruction of the part be occasioned, or a certain amount of increased pressure be applied to it, instead of an augmentation, a cessation of the particular function will ensue. Irregularity of the heart's action, or any thing that tends to disturb the equilibrium of the circulation within the cranium, produces these different effects, and they are more or less marked according to the degree of disturbance occasioned. An increased circulation of blood produces a rapid flow of ideas, sometimes delirium attended with tinnitus aurium, and other disturbances of sensation, augmented muscular action, convulsions, &c. If it continue or become greater, profound coma, or an arrestment of these functions, follow. A diminished flow of blood is known to occasion similar results; viz. convulsions, various disturbances of sensation, and of the intellect, terminating in syncope or a suspension of the functions of the nervous centres. The intelligence is influenced by exactly the same causes, and becomes disordered from an increase or diminution of the natural stimuli. Excesses in diet and in intoxicating drinks produce mania, and a like effect has been occasioned by too scanty an allowance of food. We see, therefore, that incipient disease or irritation, by means of moderate or partial pressure on any portion of the nervous system, more immediately connected with motion, sensibility, and intelligence, produces excitement of that part, followed by an increased or augmented action, but that complete pressure or destruction of the part on which each respectively depends, causes total loss of either.

When any portion of the motor or sensitive tracts have been destroyed, paralysis occurs in all the parts furnished by nerves which arise below the injury. This may result from pressure or disease affecting the whole diameter of the tract. As the tracts diverge within the cranium, there is less liability here for the whole diameter to be involved; hence we meet with cases of large chronic abscess in the cerebral lobes, disease of the corpora striata, &c., without corresponding disturbance, and with other instances where death has taken place, and, contrary to all expectation, the brain has been found extensively diseased. In these cases large portions of brain have been lost by interstitial absorption, a process to which cerebral substance is liable in common with the other textures, and which prevents the effects of pressure. Thus, if the distension and pressure be gradually applied, the power of accommodating itself to circumstances which the brain so far possesses, will prevent any great disturbance of the functions belonging to the healthy portion, until the disease has reached a certain extent, when its effects are manifested. The functions of the nervous centres, however, are almost invariably destroyed, if sufficient pressure be suddenly applied; and that the pressure is the disturbing cause, is placed beyond doubt by the recovery which takes place on this cause being removed. Should this affect that portion of the tract in which the fibres are conveyed and concentrated, more fatal results follow; hence the well marked and immediate effect of lesions in the pons varolii and medulla oblongata.

It is evident that a knowledge of the above general law is of the utmost importance, more especially when connected with the result of physiological researches. For if the opinions with respect to the brain and spinal cord formerly alluded to be correct, much of the obscurity which surrounds this subject will be dispelled. At all events, we consider that the present state of anatomical, physiological, and pathological knowledge, fully warrants our adopting such opinions as explanatory of the effects of disease. Here, however, much caution is necessary, for each of these methods of inquiry, as respects the nervous system, are peculiarly liable to fallacy. We need not point out the deceptions which a minute inquiry into the structure and arrange-

ment of the nervous tissue may occasion, or the numerous objections that exist to experiments on the lower animals, especially where the brain is concerned. The post mortem appearances found after death, which are by many considered sufficient to explain functional alterations, are in many cases quite incapable of throwing any light on the symptoms, and, as data for pathological conclusions, are often most fallacious. This will readily be granted by those practically acquainted with the difficulties of distinguishing a natural from an unnatural degree of softness; the impossibility in many cases of determining what amount of vascular congestion is to be denominated a morbid lesion; or in deciding the boundaries between the sound and diseased tissue. Again, certain morbid conditions may be present during life, and yet leave no traces of their existence after death. Does a knowledge of this fact enable us to deduce the cause from the effects? This may also lead to much error, but if the conclusions are consonant with the united facts of anatomy, physiology, and pathology, this method of reasoning will perhaps enable us to approximate as near the truth as the state of medical science will permit. Congestion within the cranium, for instance, will occasion pressure on the brain as well as a depression of bone, or an extravasation of blood; but who can calculate the amount or extent of such pressure except by its results? If therefore it has been demonstrated that slight pressure causes increased action, and complete pressure loss of function, and if pain, convulsions or delirium, manifesting the former, or loss of sensibility, motion, or consciousness demonstrating the latter, be present, while after death no structural disorganisation can be discovered that will otherwise account for such symptoms, are we not authorised to conclude that a state of congestion has occasioned partial or complete pressure on those portions of the nervous system which furnish the conditions necessary for intelligence, sensation, and motion? We answer this question in the affirmative, for by such means only is it possible to give a rational explanation of the phenomena of nervous affections. Hence we have been led to divide all nervous diseases into four classes, the Cerebral, Cerebro-Spinal, Spinal and Neuro-Spinal, according as the brain, spinal cord, or nerves appear to be either alone or jointly concerned in producing the essential symptoms which distinguish one from the other.

It has been observed by all pathologists, that the same train of symptoms has been caused, not only by different degrees of intensity in the same lesion, but by the various lesions to which the nervous centres are liable. Now as the morbid appearances observed after death are so different, although they give rise to the same symptoms during life, we cannot ascribe these to the nature of the organic alteration, but must attribute them to something which all these changes have in common: and it appears to us that they all act in one of two ways, either of which is sufficient to produce the morbid phenomena, namely, by pressure, with or without organic change; or by destruction of the part from disease. Pressure, it has already been stated, is occasioned by a change in the circulation, and, in many cases where organic alterations have been discovered, it is presumable that these do not act merely by their presence, but because they render the nervous centres more liable to be affected by such causes as produce this change in the circulation.

Were it possible to regulate pressure or organic change, so that the portion of the brain engaged in the manifestation of the mental faculties might alone be influenced, delirium, coma, and mental derangement might be produced without affecting the sensibility and power of motion. In this case, there would be no disposition to move, but spasmodic action might be induced by the application of stimuli. In like manner, were it possible to circumscribe pressure or disease to the motor or sensitive tracts, we might cause loss of motion without loss of sensibility, or convulsions and paralysis, while the mental faculties and sensibility remained perfect. In some rare instances this is the case; but the gradual manner in which the various portions of the brain are lost in each other, together with their proximity and consequent

liability to participate in disease, sufficiently explains why, in the generality of cases, impairment of motion, sensibility, and intellect, are more or less produced together.

It may be thought by some, that the opinions here advocated are too mechanical, and that we are not warranted in ascribing to pressure so many of the morbid phenomena that are presented. No doubt the activity of the brain is considerably modified by the quality of the blood distributed to it; the tissue also of which it is composed is liable to structural and constitutional differences like every other. But these circumstances of themselves, however they may predispose to disease, cannot be supposed to produce those marked effects which may be occasioned and dissipated with so much rapidity, or which are confined to one part of the nervous system and not to others. The fact also that tumours and other organic alterations are not liable to any sudden change, while the principal feature of many diseases they are supposed to occasion is their paroxysmal character, renders it highly probable, if not certain, that the more immediate cause must be attributed to some temporary local, or general, congestion of the nervous centres, a pathological condition which may often exist in the living subject, and leave no traces of its existence after death. While, therefore, innumerable facts prove that pressure is capable of producing all the phenomena, and that this pressure may take place without leaving any appreciable lesion, we conceive ourselves warranted in attributing to this cause and to structural disorganisation, the generality of those symptoms which distinguish diseases of the nervous system.

INFLAMMATION OF THE BRAIN.

Preliminary observations.—*Precursory symptoms of cerebral inflammation.*—*Cerebral determination and congestion.*—*Cerebral congestion from debility and inaction.*—*Cerebral irritation, determination, and congestion, in infants and children.*—*Inflammation of the dura mater.*—*Meningitis.*—*Acute meningitis.*—*Varieties.*—*Phrenitis.*—*Meningo-cerebritis.*—*Hydrocephalic.*—*Anatomical characters of meningitis.*—*Chronic meningitis.*—*Cerebritis.*—*Acute general cerebritis.*—*Acute partial cerebritis.*—*Chronic cerebritis.*—*Intermittent inflammation of the brain.*—*Anatomical characters of cerebritis.*—*Softening.*—*Suppuration and abscess.*—*Ulceration.*—*Induration.*—*Comparative frequency of the several forms of cerebral inflammation.*—*Predisposing causes.*—*Diagnosis.*—*Prognosis.*—*Treatment of the several forms of cerebral inflammation.*

THE diseases of the brain are, at the present moment, more obscure than any other great class in the nosology. Twenty years ago, the same was said, and with truth, of the diseases of the lungs and heart; but the elucidation and corroboration of the general symptoms by the physical signs derived from auscultation, percussion, &c., have reversed the proposition, and not only redeemed these diseases from their obscurity, but actually rendered their diagnosis more precise and certain than that of any other important class. There are no physical signs applicable to the brain; and, from the circumstances in which the organ is placed, it is to be feared that none will ever be discovered. Our diagnosis, therefore, must rest upon physiological and pathological inductions; and, if inductive signs vary much in more simple organs, in consequence of mere variations of circumstances, they must be, and actually are, infinitely more variable and complex in reference to the brain, an organ of great structural complexity, discharging multifarious and most important functions, and connected by the finest relations with all the other parts of the system. Still, physiology has done much, and is every day doing more, to dissipate the obscurity of the diseases of the brain; and we may rationally anticipate that our

knowledge of them will sooner or later be greatly simplified and extended, though it will never, perhaps, obtain that physical precision and certainty which we enjoy with respect to the diseases of the chest. It is a duty, therefore, considering the importance and extent of the class, to prosecute the investigation with unremitting assiduity and with cheerful anticipations of the future. Impressed with this feeling, we are disposed to encourage every attempt to unravel the several varieties of diseases of the brain, and to assign to each its characteristic symptoms. In doing this, however, we should be jealous of allowing the spirit of generalisation to tempt us beyond the boundaries of well ascertained facts, such a procedure being calculated to retard, rather than accelerate, the progress of science.

Precursory symptoms of inflammation of the brain. The precursory symptoms of inflammation of the brain constitute several groups of affections so troublesome in themselves, so formidable in their consequences, and so frequent in their occurrence, that we need no apology for dwelling upon them at considerable length. The subject will be distributed under the several heads of, 1. *Cerebral determination and congestion*; 2. *Cerebral congestion from debility and inanition*; 3. *Cerebral irritation, determination, and congestion, in infants and children.*

1. *Cerebral determination and congestion.* When blood flows in preternatural quantity to the head, in consequence of increased arterial action, either general or local, the state is designated by the epithet, "*cerebral determination*," or, popularly, "flow of blood to the head." When the active determination exceeds a certain point, the blood, not being carried off by the veins as rapidly as it is introduced by the arteries, accumulates in the latter system of vessels; probably, we think, with a slight increase of the total amount within the head, and constitutes the state denominated, "*active cerebral congestion*." When, on the contrary, an accumulation takes place, not from preternatural arterial determination, but either from deficient contractile tone of the cerebral capillary vessels, whence they do not propel their contents with sufficient freedom on occasions of ordinary acceleration or excitement of the circulation; or from a mechanical impediment to the return of the venous blood from the head, as a tight cravat, a tumour in the neck or chest compressing the descending veins, valvular disease, dilatation with attenuation, softening, or any other form of obstruction to the circulation through the heart, the state is then denominated "*passive congestion*," and its seat is principally in the veins and their sinuses.

It was formerly supposed that the symptoms connected with these three states of active determination, active or arterial congestion, and passive or venous congestion, were dependent on the simple circumstance of an increased quantity of blood existing in the head. But it was shown by Dr. Kellie that, when animals were bled to death, the head invariably remained as full of blood as natural: whence he inferred that the cranium, on the syphon principle, was always necessarily full of blood, and that, from the assumed incompressibility of its solid contents, it could not admit any additional quantity. Hence, the followers of Dr. Kellie have explained the symptoms of the above diseases on a different principle; namely, that when either the arterial or the venous system of vessels is congested, the opposite system is compressed and depleted, whence there results an obstruction to the circulation through the brain, and consequent disturbance of its functions. Though we have reason to suspect that experiment will hereafter prove the brain to be capable of admitting a small additional quantity of blood, we, notwithstanding, entertain no doubt of the general accuracy of the above explanation, as no other equally accounts for all the phenomena.

In accordance with this view, then, it may be stated in general terms, 1. That the symptoms of active determination are those of excitement or exaltation of the cerebral functions; since there is increased arterial action, yet not congestion enough to obstruct the circulation and occasion the opposite train of symptoms. 2. That the symptoms of active or arterial congestion are those of depression of the cerebral functions; because, here, the disease has proceeded

to the extent of occasioning an obstruction to the circulation through the brain. 3. That the symptoms of passive or venous congestion are likewise those of depression of the cerebral functions; because, here also, there exists an obstruction to the circulation. Now, the three states in question are often the precursors both of inflammation of the brain, in any of its forms, and of apoplexy and palsy; nor can we always determine, in individual instances, why they conduce to the one rather than to the other; but we think it true, as a general rule, that increased determination, implying augmented arterial action, is equally productive of inflammation and of apoplexy and palsy; while congestion, especially the passive form, is more allied to apoplexy and palsy than to inflammation. Sometimes the nature of the exciting cause determines whether the premonitory symptoms shall issue in inflammation or in apoplexy: thus, stooping may occasion apoplexy, while mental excitement may induce inflammation. So formidable are these consequences, whether of one kind or the other, that the states conducing to them must be looked upon as serious maladies; and it is important to the student to know that, in practice, he will encounter an incomparably greater number of "determinations" and "congestions"—in other words, of precursory symptoms, than of actual inflammations, apoplexies, and palsies.

The *symptoms* of active determination (and they indicate exaltation of the cerebral functions) are, tension, or decided headach, with throbbing of the temporal arteries, generally increased by the horizontal position; vertigo, especially on stooping; heat of the head, with flushing of the face, blood-shot eyes, and excited or animated countenance; ringing, stunning, or rumbling noises in the ears; impatience of ordinary sounds, as the rustling of silk or paper; impatience of light, with scintillations and other optical illusions; general nervous excitability, so that trifling causes, as unexpectedly meeting a friend, produce agitation; wakefulness and unsound sleep, with dreaming and starting; restlessness and unwonted irritability of temper, occasionally with depression of spirits and undefined dreads; incapability of sustained and vigorous attention; pulse commonly full, though, in the very plethoric, we have often observed it weak and oppressed. In general, it is slightly accelerated. Not unfrequently there is palpitation, and occasionally angina cordis, leading the patient to imagine that he labours under disease of the heart. Such are the symptoms of active determination. They are identical in their nature with those of the first stage of acute meningitis, being merely less in degree; and it sometimes requires the utmost attention and discrimination to determine when the inflammatory action really commences. For the criteria, the reader is referred forward to the first stage of meningitis.

When determination proceeds to active or arterial congestion, or when the disease is originally passive or venous congestion, the symptoms (which now bespeak depression, instead of exaltation, of the cerebral functions) are as follows: there may or may not be headach, but there is always a sense of fulness and great weight in the head, the patient sometimes comparing it to a ton of lead, a millstone, &c. This is occasionally attended with a feeling of coldness of the head, and, in severe cases, especially of venous congestion, the temperature is often actually reduced. There is vertigo, sometimes faintness, and more rarely nausea. The eyes are dim and watery and the eyelids purplish; the veins of the forehead are sometimes visibly turgid; the cheeks, nose, ears, and lips, are purplish in the naturally florid, and rather livid in the naturally pale, the intermediate parts being pale and sallow. The countenance is dull and depressed; the sight is defective, so that the patient can seldom read small print, and there are sometimes dark moats floating before the eyes, double or bickering vision, and occasionally transient blindness. The hearing is obtuse, often with rumbling and rushing noises. There is oppressive drowsiness when awake, and sleep at unusual hours; frequent yawning; dejection and apathy of mind; intellectual sluggishness; confusion of thought, and sometimes momentary unconsciousness; diminution or loss of memory—especially forgetfulness of words, names, and spelling, and the substitution of one name,

word or letter, for another; corporeal lassitude; aching of the limbs; and, in severe cases, cramps, twitchings, numbness, formication, paralytic feebleness, with a vacillating and stumbling gait; indistinct, trailing, or hesitating articulation; difficulty or "stiffness" in opening and shutting the eyelids; sometimes transient loss of sensation and voluntary motion. The pulse is weak, oppressed, or sluggish (*i. e.* tardus), often slower than natural, and occasionally unequal.

Such are the symptoms of congestion. The whole are not to be expected in every case, and frequent variations in intensity are observable at different times. The more urgent symptoms of diminished sensibility and intellectual power, with the more considerable muscular phenomena, are wont to occur in paroxysms of a few minutes' or hours' duration only, the patient being comparatively comfortable, though far from well, during the intervals; and these intermissions, with other symptoms, indicate that the disease is still congestion, and not yet what may be strictly considered apoplexy—still less, inflammation.

The duration of the symptoms of cerebral congestion is very variable. Some patients experience a single attack only; others have attacks at long and irregular intervals, often in connection with some obvious and adequate exciting cause; in some, we have known the attacks recur annually in the spring; in females, we have frequently seen the symptoms return regularly at the catamenial period, during consecutive years, especially when the secretion was scanty and the patient of full habit, or a free liver. In others, again, we have known more or less of the symptoms, with occasional paroxysms, subsist continuously, not only for several months, but even for a series of years, and issue sometimes favourably and sometimes the reverse, the result being very much dependent on the nature of the causes, whether remediable or not. In females, at the period of catamenial cessation, we have frequently known the symptoms continue from two to six or seven years, and then completely subside. Andral mentions a case in which a man was not exempt from one or other of the symptoms for a single day during thirty years.

In the more severe cases, especially the congestive, there generally supervenes, as a consequence of the cerebral affection, a greater or less degree of derangement of the stomach, bowels, and liver, to which, indeed, we have often noticed the patient disposed to ascribe the whole of his symptoms. The truth is, that there subsists an intimate connection between the cerebral and chylipoietic systems, and derangement of either seldom continues long, without more or less disturbance of the other,—a fact which will be more fully developed in the article *Cephalalgia*.

The *diagnosis* between active determination and active or arterial congestion is formed by the symptoms in active determination being those of exaltation of the cerebral functions, the reverse being the case in congestion. When the states are passing into each other, there will be a temporary mixture of the symptoms. It is common for patients subject to determination to experience occasional paroxysms of congestion.

Active or arterial congestion is distinguished from passive or venous by the precedence, in almost all cases, of some symptoms of active determination, and often by the intermixture at intervals of symptoms of cerebral excitement with those of depression. A plethoric, youthful, and robust state of the patient, also favour the diagnosis of active congestion. The converse series of circumstances indicate passive or venous congestion. There are cases, however, in which the two forms are so nearly allied and the circumstances so mixed, that the diagnosis requires the most careful consideration.

The diagnosis of active determination from meningitis is formed, as already hinted, by a comparison of the symptoms and causes of the two, to which the reader is referred, as our limits do not here permit the institution of a long comparison. The same may be said of the diagnosis of either variety of congestion from cerebritis and from apoplexy.

With regard to the *prognosis*, active determination is in general easily curable,

unless its predisposing cause be of an organic or otherwise irremediable nature, or unless the patient be intractable under treatment, especially with respect to diet, regimen, intellectual exertion, and exciting causes in general. Still, the disease is serious; because it may suddenly issue in inflammation or apoplexy, or, if neglected, may lay the foundation of permanent cerebral "delicacy," impaired intellectual capacity, and derangement of the general health. The prognosis of active and passive congestion is, for the same reasons, still less favourable, though the diseases of themselves seldom compromise life. The particular prognosis in individual cases depends much on the predisposing cause. Thus, if it be organic disease of the brain, valvular disease of the heart, a tumour in the chest, or other irremediable cause, the ultimate prognosis is unfavourable, and *vice versâ*.

The anatomical characters of the subject under consideration are important, though it was formerly little understood. Active determination is never fatal of itself; but, from its occasionally existing at the time when other diseases prove fatal, as fevers, &c., it is ascertained to be attended with increased florid vascularity of the brain and its membranes, without any other change, except, occasionally, a little serous effusion, probably an exudation after death from the gorged vessels. But though the effects of active determination are seldom witnessed after death, those of congestion, both active and passive, are not unfrequently seen; for the patient sometimes dies suddenly from the supervention of congestive or "simple" apoplexy, and the morbid appearances, under these circumstances, are only a higher degree of the congestive condition which immediately preceded the fit. Further, venous congestion is frequently seen in fatal cases of organic disease of the heart attended with great obstruction to the circulation; and in those who die of cold, or of apnoea, whether occasioned by drowning, strangulation, diseases closing or greatly obstructing the air-passages, opium or other narcotics, tetanus fixing the muscles of respiration, or any other cause of deficient respiration.

It may be premised as a fact now fully established, that a patient may die with symptoms of congestion from any of the above causes, yet, after death, not a vestige of any morbid condition in the brain may remain. The refrigeration of the blood, and its accumulation in the great vessels, has removed all appearance of increased vascularity. In the great majority, however, the congestion is greater than can be removed by these causes, and preternatural injection consequently remains. Its appearance differs somewhat, according as it is active or passive.

Active or arterial congestion is characterised by a rather more florid tint both of the membranes and the cerebral substance, and by less considerable engorgement of the great veins and sinuses. In short, as the congestion commences on the arterial side, it is more in the capillaries and less in the great veins; and this is, without doubt, more decidedly the case during life, because, subsequent to dissolution, the arteries, by their tonic contractility, propel the greater part of their contents into the veins. Passive or venous congestion, on the other hand, is characterised by a darker tint of the capillaries and a greater engorgement of the large veins and sinuses, especially when it commences in the latter and is propagated retrograde to the capillaries. In extreme cases, the appearances are exceedingly marked. Thus the scalp, on division, yields a stream of dark blood; the sinuses and large veins are gorged, and an unusual degree of dark ramiform vascularity is exhibited by the capillaries of the pia mater. The denuded surface of the hemispheres presents a preternaturally dark tint, and, when the organ is divided, its substance, both cortical and medullary, especially the former, displays an extraordinary degree of dark venous speckling, occasioned by the presence of coloured blood in the naturally colourless capillaries; and when this speckling is removed by wiping, it is quickly reproduced by a new exudation from the divided vessels. In some cases, especially those connected with organic disease of the heart, cyanosis, emphysema, and fatal polypus, the general tint, even of the medullary substance, is so

lowered, as to be represented on paper by a delicate wash of neutral tint. Dr. Bright has published a plate exhibiting the darkest tint of this kind that I have witnessed.

Serous effusion, in small or moderate quantity, is a frequent associate of congestion, both active and passive; being the natural mode by which, as in ordinary dropsies from obstruction of the circulation, the gorged vessels disburden themselves of their unnatural load. The relief is sometimes so complete, that all appearance of preternatural congestion is entirely removed; and such cases, when fatal, were formerly denominated *serous* apoplexy, under the erroneous supposition that the serous effusion was the only morbid phenomenon. Abercrombie showed that it was merely a consequence of previous congestion, and that it was not, as imagined, confined to the aged and debilitated, but incident to all ages and constitutions.

The *causes*, both predisposing and exciting, are identical with those of inflammation of the brain and of apoplexy, to which we refer the reader for details, contenting ourselves here with a brief general enumeration. The *predisposing causes* are, scrofula, hereditary irritability of the nervous system, early age, advanced age, the sanguine temperament, especially with violent temper or passions; habitually excessive intellectual exertion; stooping professions, as gardening, which cause atony of the cerebral vessels; previous attacks of determination or congestion leaving similar atony; plethora; hypertrophy of the left ventricle, with or without dilatation; obstructions to the circulation through the heart from valvular disease, dilatation, or softening; excrescences from the cranium; obliteration or undue contraction of a sinus; tumours in the brain. The *exciting causes* are, febrile diseases, especially the exanthematous, — some of which, particularly variola, scarlatina, and rubeola, may be preceded, as well as followed or attended, by the congestive paroxysm; intermittent fever or “masked ague,” which may occasion intermittent fits of congestion; injuries of the head; irritation or inflammation, acute or chronic, of the mucous membrane of the stomach and bowels — particularly in children; dentition; worms; bilious accumulations — an exceedingly frequent cause of headach, with nausea; suppressed natural evacuation, and suddenly or otherwise injudiciously checked morbid discharges; immoderate meals; too free and stimulating a diet, especially in the sedentary and naturally plethoric; intoxication; exhaustion from fasting; over-fatigue, &c.; atmospheric electricity, as before a thunder-storm; a relaxing south-west wind; sudden mental emotion or great intellectual efforts; loud noises; violent corporeal exertions in the predisposed; the act of stooping; tight ligatures round the neck or trunk; the epileptic fit, of which the subsequent drowsiness proceeds from congestion; hot weather and insolation; still more, cold weather and intense cold; sudden transitions from hot to cold weather, and *vice versâ*; opium, hyoseyamus, belladonna, camphor in large doses, tobacco, strychnia.

In the *treatment* (which it may be proper to state has no reference, in the present section, to cases resulting from debility and inanition, nor to those of children), the first object should be to relieve the immediate symptoms. Venesection or cupping should be promptly employed, and the practitioner should not be unwarily scared from this important measure by the feeble, slow, and oppressed state of the pulse in congestive cases, especially if occurring in plethoric or otherwise robust subjects; for the pulse generally rises when the cerebral oppression is relieved by the bleeding. As a general rule, from $\frac{3}{4}$ xii to xx, drawn in the erect position, will suffice for the first abstraction, the larger quantity being suited for active congestion in young, robust, and plethoric subjects; and the smaller for mere determination and congestion in weakly subjects, or of the passive form. Immediately after the first bleeding, the patient should be actively purged. If the congestive symptoms threaten an immediate fit of apoplexy, a strong purgative enema is the most expeditious means. Infus. Sennæ Co. $\frac{3}{4}$ viij, magnes. Sulph. $\frac{3}{4}$ i, Ol. Ricin. $\frac{3}{4}$ j, and $\frac{3}{4}$ viij of warm water, will generally suffice. If

Infus. Sennæ Co. is not at hand, Extr. Coloc. Co. \mathfrak{z} ij, rubbed up with \mathfrak{z} vij of water, may be substituted. Simultaneously, a full dose of calomel and Extr. Coloc. Co., or of croton oil, should be given by the mouth, and should be followed, in two hours, by a black draught, repeated, if necessary, so as to procure six or eight copious evacuations. If immediate relief be not afforded by the first bleeding, the speedy immersion of the feet, up to the knees, in hot water rendered stimulant by mustard, and the simultaneous application of an ice-cap on the head, are remedies of great power in protecting the head from apoplexy or inflammation,—the former by acting as a derivant, and the latter by constricting the cerebral vessels. If, by the time that the purgatives have freely acted, the congestive symptoms should not be satisfactorily relieved, or even earlier, if they strongly menace an apoplectic, paralytic, or convulsive fit, \mathfrak{z} vij to xii more of blood should be drawn from the nape, temples, or ears, by cupping; a measure which we have generally observed to be more efficient than a second bleeding from the arm. Meanwhile, the head and shoulders should be kept well raised, even during the night; the head should be kept cool by an evaporating lotion and the occasional use of ice, and cool fresh air should be freely admitted into the room. By calomel and colocynth, followed by neutral salts, five or six liquid motions should be procured daily for a week or ten days, except in the passive congestion of weakly subjects, for whom two or three motions will suffice. If, however, there be bilious accumulations, mercurial cathartics may be employed even in the latter class of cases, the bile being a far greater irritant than the remedy. The diet should not at the utmost exceed white fish, thin broth, and farinaceous articles, for a week or ten days, and, in the plethoric and robust, farinaceous mucilages and bread are sufficient. Thin veal or chicken broth is a bland diluent, highly suitable for bilious cases.

The means now detailed will generally succeed in removing the immediate attack of determination or congestion; but, for the eradication of the disease, it is requisite also to dissipate the predisposing cause, and the measures will differ according to its nature.

Thus, if general plethora, whether connected with a naturally plethoric tendency, or a too full and stimulant diet, or both, be the exciting cause, the depleting treatment already commenced must be prosecuted in a moderate degree for several weeks, or even months, according to the effect. The blood-letting may require to be repeated to the extent of \mathfrak{z} vij to xii once, twice, thrice, or more, at intervals of two to six weeks, according to the indications in each case. A few patients feel languid and more confused in the head after the loss of a quantity so small even as that specified. In these cases, we have often found the abstraction of two to four ounces of blood, by cupping, round the occiput and ears, once a week or less, produce the desired effect without inconvenience. Probably, a part of the benefit is to be ascribed to the counter-irritant effect of the scarifications. In cases of suppressed bleeding from piles, the application of leeches to the anus sometimes affords more relief than depletion from the head itself; and, in the far more common cases of suppressed catamenia, occasioning cerebral determinations and congestions, we have often found the application of six or eight leeches to the groins, at each period, not only afford satisfactory relief, but also restore the natural secretion. Together with abstraction of blood, moderate aperients should be employed, so as at first to procure two or three evacuations daily, and afterwards one or two. If the evacuations be dark, offensive, and of green or orange tinge, indicating bilious accumulations, mercurial aperients should be employed with vigour till these appearances have ceased. The patient should long continue on a diet of broth, fish, and fowl, and should return to animal food by taking it on alternate days exclusively. It is also highly beneficial to restrict him to as small a quantity of liquids as is consistent with his comfort, as they readily cause vascular repletion, and sometimes, according to our observation, completely counteract the effect of the other means. It is needless to say that all stimulant potations

should be interdicted. Active, though not violent, exercise should be enjoined on the plethoric and sedentary, and an immoderate indulgence in sleep should be strongly discountenanced. The head should be kept cool by having the hair closely cut and by sleeping without a nightcap. During convalescence, the habit of washing the head every morning with cold water, or the use of the shower bath, is sometimes eminently useful by giving tone to the cerebral vessels.

If hypertrophy of the heart be the predisposing cause of the cerebral affection, active exercise should be rigidly interdicted; and a dangerous mistake in this respect is apt to be made by those who are inattentive to diseases of this organ. On the same principle, mental excitement, and any other cause of acceleration of the circulation, should be carefully avoided. Bleedings to about $\frac{3}{4}$ vi every three to six or eight weeks, moderately low diet, as meat on alternate days only, mild aperients, and the occasional use of digitalis, hyoscyamus, prussic acid, and hop, must be continued with uncompromising regularity for a year or more, till the hypertrophy is cured; care being taken that this tranquillising system be not carried so far as to increase the palpitation by inducing anæmia.

If the predisposing cause be venous retardation, as from valvular disease or dilatation of the heart, tumours in the neck, chronic disease of the lungs, &c. after relieving the immediate symptoms of cerebral congestion, the practitioner must turn his attention to curing or palliating the primary diseases as far as is practicable; but it may be remarked, in general terms, that such cases do not admit of considerable depletion.

Intermittent headaches from malaria are, in general, readily cured by large doses of quina, or this combined with arsenic; and, as the patient often becomes anæmic, the strong preparations of iron should be given in the sequel.

In obstinate and protracted cases of all kinds, a series of blisters, or an issue or seton on the nape, are valuable auxiliaries. In cases attended with dyspeptic and biliary derangement, we have often found that country air, especially of the clear, dry, bracing kind, seemed indispensable to the completion of a cure, the patient always retrograding on a return to town.

2. *Congestion from debility and inanition.* This affection comprises a much larger number of cases than is commonly supposed; and we think that it has been greatly overlooked, imperfectly understood, or too cursorily noticed, by professed writers on diseases of the head. As its treatment is almost diametrically opposed to that of the preceding varieties, and as it therefore requires to be carefully distinguished from them, we have assigned to it a separate section, for the purpose of giving it the utmost possible prominence.

The patient generally represents himself to labour under a "flow of blood to the head;" a prepossession strongly favoured by the frequent "rushing noises" in his ears, and throbbing of the temporal arteries: he is therefore astonished and somewhat incredulous when informed that his condition is the precise converse of an increased determination; namely, a deficient circulation through the head, dependent on debility and innutrition, and leading, for reasons which will presently be explained, to venous congestion of the organ.

The *symptoms* are a moderate degree of those of congestion which have been already enumerated. They occasionally, however, proceed so far as to occasion, not only numbness, formication, twitching, and paralytic debility of the muscles, but even slight delirium, epileptiform convulsions, and coma. For instance, three patients fell under our care in 1837, who had each experienced a single epileptic attack, but who have subsequently been exempt from the malady.

This class of cases may easily be recognised by the patient being decidedly pale; this character, in the naturally florid, exhibiting itself on those parts of the face which are properly destitute of high colour, while the redness on the cheeks is dimmer than natural; by the paleness being attended with loss of flesh in most, and by muscular flabbiness in all; by the pulse being small, weak, and slow, during periods of calmness; but, as the patient is morbidly excitable and nervous, it is readily accelerated by slight causes, and is then at-

tended with the feeling of palpitation; by the headach being referred principally to the courses of the great sinuses, especially where they traverse the occipital bone; by an unusual degree of languor and muscular debility; by the patient probably stating that he had repeatedly been bled, and always felt worse after it; finally, by the existence of some cause of deficient nutrition, as protracted dyspepsia, dribbling piles of old standing, menorrhagia, abortion, leucorrhœa, immoderate lactation, over-exertion, whether mental or corporeal; deficient, innutritious, or unwholesome diet, especially abstinence from animal food, to which females of the higher classes are much addicted; damp, confined, dark air; and, in short, any other cause of anæmia.

The *pathology* of this affection has been differently viewed. M. Andral, after citing cases of excessive loss of blood and of ordinary chlorosis, presenting the symptoms characteristic of the various forms of cerebral congestion, expresses his opinion that they are referrible to "a state the entire opposite of congestion; in other words, anæmia." "We must admit," he pursues, "that the brain is disturbed in its functions, because it is not suitably stimulated or nourished by the too poor or too thin blood which the heart sends to it." (*Clin. Méd.* tom. v. p. 300.) This may be partly true; but we venture to think that the able writer quoted has not, in the present instance, arrived at the whole truth. We believe that there is really venous congestion in the cases alluded to, originating, perhaps, in the *unfilled* state of the arteries, so well manifested by the *jerking* pulse; whence, as the cranium, on the syphon principle, must necessarily be always full, the veins acquire a predominant degree of repletion, and eventually obstruct the circulation through the organ. The fact of congestion, whatever be the theory, rests on strong evidence. Dr. Kellie found the veins and sinuses of the brain gorged in animals which he had bled to death. M. Andral himself cites a case of fatal cerebral hemorrhage in a patient at La Pitié, who laboured under the highest degree of anæmia from uterine hemorrhage connected with cancer! Nor is this case by any means solitary. In instances of patients who have died comatose, the large veins and sinuses have been found gorged, either with or without serous effusion, while the cerebral substance was remarkably pale. In a few cases, serous effusion alone has been found; when, as shown by Abercrombie in reference to "serous" apoplexy, there is the strongest reason to believe that the dropsy was merely a result of previous congestion, which it had entirely removed. Again, the symptoms of anæmic congestion are remarkably relieved by the horizontal position and by stimulants, which promote the afflux of arterial blood to the head, and thus tend to restore the equilibrium of the circulation.

This explanation applies to several degrees and aspects of the same affection; and it is desirable to keep these varieties in view, in order that we may clearly discern the analogy which prevails throughout the whole class. Thus, a slight degree of congestion constitutes the never-failing headach of chlorotic females; a higher degree is the form of which we are at present treating; a still higher degree results from more rapid and powerful exhausting agencies, as sudden and excessive loss of blood, profuse diarrhœa, energetic antiphlogistic treatment for acute inflammations, &c. The latter, when affecting infants and children, has been denominated spurious hydrocephalus, or, more recently, by Drs. Gooch, Hall, Abercrombie, &c. the hydrencephaloid disease; a truly important distinction, as it differs from real, that is, inflammatory hydrocephalus, no less in treatment than in pathology. As it is often confounded with inflammation of the brain, we reserve it for consideration in a corollary to that part of our subject, in order that the distinction may be rendered more prominent by direct contrast.

Treatment. Congestion from debility and innutrition, if exempt from organic or other serious complication, is so easily and promptly curable, that, as the patient is usually in a very distressed condition, the practitioner generally acquires great credit by his cases.

Supposing that there be urgent symptoms of cerebral irritation or congestion immediately threatening apoplexy, epilepsy, or inflammation, the legs should be speedily immersed in a foot-bath (which is improved by mustard); cold may be applied to the head, if it be hot; a strong purgative enema should be administered, and be followed as soon as practicable by an active cathartic by the mouth. Should the symptoms resist and create alarm, the propriety of abstracting four to six ounces of blood by cupping or the application of leeches, or, what is still better, by opening the jugular vein, may be considered; for there is no inconsistency in employing a local depletion to relieve a local congestion, even while we are supporting or stimulating the system at large; and we have met with a small proportion of cases in which this treatment not only seemed to be indispensable, but was followed by speedy relief. It should, however, be resorted to reluctantly, and with the utmost circumspection, the depletion being suspended, if the abstraction of a small quantity of blood should not answer the object.

As a general rule, we prefer relieving the paroxysm on the principle of derivation as now described, this mode being the safest and most scientific. But when the paroxysms come on very frequently, and, especially, when they pass speedily into epileptic fits, we have used volatile diffusible stimulants internally, in a great number of cases, with signal success. *Liq. Ammoniae* in doses of twelve minims, in three ounces of water, or *Aq. Menth. Virid.* with syrup, we have found beyond comparison the most efficient formula; the epileptic fit, unless of organic origin, seldom failing to be averted by it, provided the medicine be taken at a single draught on the first warning of the attack. On commencing the use of this or any other diffusible stimulant, the practitioner would do well to feel his way with a smaller dose, and personally watching its effects. If favourable, the patient may be entrusted with a draught, to carry constantly on his person, and take on any emergency.

Supposing the case not to present any immediately urgent symptoms threatening a fit, after clearing out the alimentary canal, and cleaning the tongue, if furred, by one, two, or more gentle mercurial cathartics, the practitioner may proceed at once to the use of tonics. Animal food, slightly under-dressed, should be given to the extent of at least three to six ounces, twice a day, at breakfast and dinner; an interval of seven or eight hours being interposed, as full meals of animal food are not well assimilated at shorter intervals. The appropriate and never-failing tonic is iron; but, unless the alimentary mucous membrane be in a perfectly healthy and unirritated condition, we have found it better to premise the use of a draught composed of infusion of cascarrilla and sesqui-carbonate of ammonia (*gr. v*), or something equivalent, thrice a day, for three or four days. If by this time the stomach and bowels have been brought to a satisfactory state, the practitioner may proceed at once to iron. He may feel his way for a day or two by moderate doses, and then proceed as speedily as possible to full quantities. We feel assured that the great utility of iron is overlooked by many, in consequence of its being administered in too small doses and for too brief a period. After making special comparative observations on the effects of the several preparations of the metal in a hundred cases each, we have found that the stronger preparations, and full doses, are the most efficacious, and that the duration of a course should extend over a month at least. No preparation has appeared to us superior in power to the well-known Griffith's Mixture (*Mist. Ferri Co.*). Of this, ten drachms may be conjoined with from one to three drachms of *Decoct. Aloes Co.* the latter not only rendering it lighter to the stomach, but insuring one free alvine evacuation daily, which is always necessary to prevent the too stimulant action of iron on the head. It may be given thrice a day, one or two hours after meals, as, on an empty stomach, it occasionally creates nausea. The same preparation in a solid form, namely, the *Pil. Ferri Co.* may be given in an equivalent dose of *gr. x* to *xv* thrice a day, provided the pills be recent and *soft*. The *Pil. Aloes c. Myrr.* may be simultaneously used as the aperient. Other

efficient preparations are, the Ferri Sesquiox. in doses of 3 ss to 3 iss thrice a day; the Ferri Sulph. in doses of gr. ij to iij, dissolved in a light bitter, thrice a day, and the Tinct. Ferri Sesquichloridi, in doses of m. xv to 5 ss, at similar intervals. These measures should be seconded by much fresh bracing air out of doors, with amusing, but not fatiguing, exercise. Whilst they are in operation, the counteracting agency of any known predisposing or exciting causes should be suspended to the utmost that is practicable. Chronic hemorrhages, as menorrhagia, bleeding piles, &c. should especially be checked. If the former be merely a passive hemorrhage from anæmia and debility, cold astringent injections and the horizontal position, with the internal tonics already mentioned, will generally suffice for the cure. Bleeding piles may generally be checked by injecting a pint of cold water, with or without an astringent, daily, after the morning evacuation, aloetic aperients being avoided, or so much softened with treacle or soap as to insure their complete solution in the upper bowels. If these means fail, the expediency of surgical assistance should be promptly ascertained by an examination of the rectum.

When there is no special counteracting cause of an intractable nature, the patient is generally well within a period varying from three to six weeks; more commonly the latter. If towards the end of convalescence, and subsequently, after the omission of the iron, aperients should continue to be requisite, those which contain a tonic are incomparably the best; as aloes with sulphate of iron, rhubarb with columba, &c.; the tonic appearing to increase the peristaltic action.

3. *Cerebral irritation, determination, and congestion, in infants and children.* In infants and children, inflammation of the brain is generally, yet not invariably, ushered in by precursory symptoms. To these the attention of the student cannot be too strongly drawn; since, though occasionally arising without obvious cause, they ordinarily constitute that familiar group, compounded of derangement of the stomach and bowels, with irritation of the brain, which he will be perpetually witnessing as concomitants of excessive or unsuitable feeding, of dentition, of ascarides or other worms, and of derangement of the liver; a group which the inattentive are apt either to regard as wholly foreign to the brain, or hastily to mistake for confirmed hydrocephalus. The cerebral symptoms are sometimes those of excitement, and sometimes, on the contrary, those of depression; not unfrequently, they are mixed. We shall first sketch the respective classes, and subsequently advert to their nature and causes.

Amongst the *symptoms of excitement*, evincing morbidly exalted sensibility of the brain, one of the first circumstances that usually strikes the attention, is, unaccustomed peevishness and restlessness, with indifference to previously amusing objects, and a vacant, abstracted air and expression, as if the little patient were preoccupied by his own uneasy sensations. In infants, the fretfulness is in many instances only to be soothed by perpetual gestation in the nurse's arms. The external senses are inordinately affected by ordinary impressions. The hearing is painfully alive to every sound; an unexpected touch with the finger, as in feeling the pulse, often causes starting and fretfulness; if the head be directed towards the window or a candle, it is impatiently averted, with frowning and winking; the pupils are frequently, though not always, contracted, in consequence of the sensitiveness of the retina; and the conjunctiva, from increased arterial action in the head, is occasionally injected. Headach is generally experienced, and is by elder children made a subject of complaint, while infants evince it by tossing, rolling, or putting the hand to the head. Wakefulness is a prominent symptom, the child seldom even dozing, and its imperfect slumbers being broken from time to time by starting and crying. Muscular phenomena are not unfrequently manifested: in infants there is a more or less frequent clenching of the fist, with the thumb drawn to the inside; a drawing back of the head, with stiffness of the neck; and occasionally a drawing back or opisthotonos of the whole spine, with rigid extension of one or both legs. We have even known these phenomena to occur when

there were very few other manifest symptoms. In elder children, there is grinding of the teeth during sleep, distortion of both eyes upwards and outwards, and sometimes squinting. Convulsions are common to all ages.

The *symptoms of depression*, evincing diminished sensibility of the brain, are characterised by the little patient being deficient in animation. Though not asleep, he lies in a drowsy state, indifferent to surrounding objects, occasionally moaning, gaping, and sighing, and irritably fretful if aroused; when more decidedly awake, he is languid, grave, pensive, silent, abstracted, and peevish; any sleep which he obtains is disturbed and unrefreshing; there may or may not be headach, vertigo, confusion. The external senses seem obtuse rather than the reverse; the face is often pale and sunk, sometimes with occasional flushes; the gait is feeble, and, when the disease is on the verge of inflammation, the patient, as Gölis remarks, "in stepping forward, raises the foot as if stepping over a threshold—he totters and staggers as if drunk."

The two classes of symptoms above described—of excitement and of depression—sometimes coexist in a greater or less degree; in which case exaltation of the external senses is conjoined with the dull drowsy state.

Whatever be the aspect of the cerebral symptoms, they are in general attended with more or less of a febrile movement, and of derangement of the alimentary canal. The pulse is accelerated, and it sometimes, especially in the cases attended with drowsiness, already exhibits an incipient degree of that oscillating inequality in speed and strength, which constitutes one of its most characteristic features in decided cerebral inflammation. The respiration is accelerated in proportion to the pulse, and is sometimes unequal and suspicious, as in confirmed inflammation. The skin is rather hot and dry; the nose and lips are dry and subject to itching, whence the child picks them—a sign often, but incorrectly, considered peculiar to worms. The tongue is white or yellow, often with red papillæ at the point and edges, and there is, in different degrees, thirst, a defective, voracious, or capricious appetite, nausea, vomiting, and fœtor of the breath. The bowels are either costive, or loose and griped, the excrements in the latter case being almost invariably mucous, and either green, black, or pale, sour and frothy. The abdomen is tumid and tense—often slightly tender on pressure.

The duration of the above precursory symptoms may be from a day or two to several weeks; but, sometimes, they are observed for a few hours only, or they do not exist at all, the child being abruptly seized with convulsions, and other marked signs of established inflammation.

The immediate *cause or pathology* of the affection consists in an irritation of the brain, occasionally arising without any cause that we can detect, and sometimes dependent on the excitement of precocious talents, but far more frequently propagated from the peripheral extremities of the nerves exposed to the primary irritation of teething, derangement of the alimentary mucous membrane, disease of the liver, surfeit, worms, &c. The cerebral irritation, there is every reason to presume, is attended with active determination and congestion of the organ, a state short of inflammation, but on the confines of it, and ready to make the transition at any moment, if not adequately checked.

Terminations of the precursory symptoms. It is the opinion of some that the class of symptoms denoting excitement is premonitory of inflammation of the membranes and surface, while the class denoting depression threatens inflammation of the cerebral substance and central parts. We have, however, so frequently seen each disease follow either class of symptoms, that we should hesitate to venture a diagnosis founded on such grounds. We should rather be disposed to think that the symptoms of excitement are dependent on active determination, and those of depression, on the ulterior state of active congestion, while the mixed symptoms are connected with a fluctuation between the two states. On this point, however, there is a want of direct and positive evidence.

The character of the inflammation in which the premonitory symptoms

issue depends greatly on the constitution, temperament, and general health of the patient.

Plethoric children, of florid sanguine temperament and healthy constitution, are apt to be affected with sudden and violent inflammation, especially of the membranes and cerebral surface, but sometimes of the ventricles and centres, with or without effusion. This constitutes the "*rapid*" hydrocephalus of Cheyne, the "*tumultuous*" of Gölis, the "*ataxic*" of Guersent, and the "*inflammatory*" of Hopfengärtner:—for writers on hydrocephalus assign this name of a symptom to every cerebral inflammation of children, whether there be "water on the brain" or not. On the other hand, feeble, puny, delicate children, especially those of scrofulous constitutions and belonging to families in which hydrocephalus has prevailed, usually present the low and protracted form of precursory symptoms and of cerebral inflammation; the congestive, and subsequently the inflammatory, action being of a much less active kind. This constitutes the "*gradual*" hydrocephalus of Cheyne, and the "*nervous*" of Hopfengärtner, because it commences like a low nervous fever, and it is of much more frequent occurrence than the rapid or any other variety.

When the constitutional state and powers are modified by existing or late exanthemata, pertussis, fever, &c. precursory symptoms are rarely distinguishable; the inflammation either making a sudden burst, or stealing on occultly till it has made dangerous progress. This is the "*secondary*" hydrocephalus of writers in general; and, when rapidly fatal and attended with serous effusion, it constitutes the water-stroke (*wasserschlag*) of Gölis.

If the reader wish to study the precursory symptoms now described in immediate juxta-position with those of actual inflammation, he is referred forward to the *Symptoms of acute Meningitis*.

Treatment of the precursory symptoms in infants and children. From the extreme frequency of these symptoms, and the great magnitude of their possible consequences, the treatment is of such importance that we offer no apology for dilating upon it rather beyond our prescribed limits. The very first manifestation of suspicious symptoms ought to arrest as much attention as if inflammation actually existed; for it must not for a moment be forgotten, that the invasion of the latter is sometimes instantaneous, and in other cases so insidious, as to elude suspicion till the disease has made irreparable progress. If these circumstances be retained constantly in recollection, the treatment for the precursory symptoms will be eminently successful. We have found that scarcely more than two or three cases per cent. have passed into inflammation.

The gums during dentition demand the first attention. Wherever they are red and tumid, they should instantly be divided by an incision down to the tooth, and sufficiently long to liberate its whole edge: in the case of double teeth, the incision should be crucial, so as to liberate the four corners. We have never found the slightest inconvenience, but greatly the reverse, result from repeating the operation once or even twice a week, if, after its first performance, there was a recurrence of redness and swelling; for the mere circumstance of bleeding the gums often affords immediate and surprising relief. In the employment of scarification, the practitioner will often find himself opposed by a popular prejudice against a supposed "hardening of the gums" from the operation. They who entertain this notion are unacquainted with the principle on which scarification is practised. The grand source of irritation resides, not in the gum itself, but in the membrane immediately investing the tooth, which, formed out of cellular tissue becoming progressively denser and tighter in proportion as it is more and more stretched by the enlarging tooth, eventually attains an exquisite degree of painful tension. When once this is fairly divided, it retracts so completely as ever after to be incapable of reuniting. It is the division of this membrane, therefore, which constitutes the great source of relief: if the superincumbent gum heal, any supposed induration of it is of little moment:

the part has only to be divided again as often as it becomes inflamed. It is astonishing how much mischief this simple operation will prevent.

The stomach should be the next object of attention. If there be reason to suspect that it is charged with a load of undigested food (and this may be apprehended if there is no other assignable cause for a sudden appearance of the precursory symptoms, and still more if any indiscretion in diet can be detected), an emetic should immediately be administered. From mxx to 5j of *Vin. Ipecac.* according to the age, may be given every ten minutes to infants under a year old, till vomiting is excited: after a year, the dose may be doubled. The powder is slower in its operation. Tartar emetic sometimes exerts a dangerously sedative influence on children under two years of age: later, it may be safely used, but as a mere evacuant it is less certain than *ipecacuanha*. Glasses of warm water should be perseveringly administered after every act of vomiting, so long as the water is returned with any intermixture of the contents of the stomach. The whole process may be greatly expedited by titillation of the fauces with the finger or a feather. This effectual evacuation of the stomach will, with few exceptions, immediately remove all the symptoms, if they originated merely in a surfeit: still, to make sure, it is well to add an aperient, to scarify the gums, if red, and to reduce the diet for two or three days.

Supposing there be no reason to suspect a surfeit, the attention should next be directed to the bowels. They should be completely evacuated with all possible promptitude; for detained fæces, whether indurated or of acrid irritating quality, may alone occasion all the symptoms. A child of æt. 2. may take *Rhei Pulv.* gr. vi. with *Hydrarg. cum Cretâ* gr. iv. or *Hydrarg. Chlorid.* gr. i vel ij. a lavement of half a pint of warm water, with *Ol. Ricini* 5ij. being simultaneously administered. In an hour and a half, *Ol. Ric.* 3ij. may be given by the mouth; and, if the body should not have acted freely at the expiration of four hours, the lavement and powder may be repeated. If *ascarides* be suspected, the lavement should contain 3ij. or ij. of *Ol. Terebinth. Purif.*; and as much may be given, with mucilage &c. by the mouth, instead of the castor oil. The head, meanwhile, should be kept cool, by interdicting caps, cutting the hair if abundant, allowing a free access of cool fresh air, and applying an evaporating lotion if the heat be considerable and the cerebral symptoms urgent. By this combination of means, the more alarming features of the case will generally be removed in a few hours—so soon, in short, as the medicines have fully acted. If the child be attacked with convulsions, after scarification of the gums, he should, without loss of time, be immersed up to the shoulders for five to fifteen minutes, according to the age, in a warm bath at 98° , with the trunk in the erect position, and a cold lotion or ice should simultaneously be applied to the head. The bath, by diffusing the blood over the surface, withdraws it from the head, while the cold application co-operates by constricting the cerebral vessels. If a warm bath cannot speedily be procured, a thin stream of cold water should be directed from an elevation of two or three feet on the vertex, which will often be attended with immediate success. This remedy, to which Abercrombie is very partial under the present circumstances, is perhaps equally efficacious as the warm bath, and certainly more safe; for the bath, if at too high a temperature or continued too long, especially in plethoric children, may be directly detrimental; and we account for this on the supposition that, when the whole blood of the body is expanded, and the circulation accelerated by the heat, the cerebral congestion is increased. The temperature, therefore, and duration of the bath, should always be so regulated as, with the assistance of cold applications, to prevent the face from becoming flushed. In the case of plethoric children, we should not trust to the bath alone; but should, either previously or during the immersion, draw blood from the jugular vein, or, in infants, by means of leeches. It must be clearly understood that we have hitherto been speaking of acute convulsions, from a state of the brain short of inflammation, yet verging upon it: if the practitioner judge that inflammation has actually taken place, the treatment now prescribed must be

followed up by that for acute meningitis. Under no circumstances of precursory symptoms should narcotics of any description be employed: though recommended by some, our personal experience is strongly opposed to them; they are never necessary, and always dangerous.

But though the above means may succeed in removing the urgent symptoms within a day or two, let not the practitioner imagine that he has yet cured his patient. If the bowels have been deranged for some time, as a week or more, we feel certain, from ample observation, that a complete cure is only to be effected by a course of alterative aperients, with antiphlogistic diet and regimen; for such a state of the alimentary mucous membrane as that in question—a state of irritation and active congestion, not unfrequently passing into inflammation—demands, not only appropriate treatment, but a certain length of time for its effectual cure. Hydrarg. cum Cretâ gr. ij, with Cretæ Præparatæ gr. iij, should be given every eight hours to infants between one and two years old: under or beyond this age, the dose may be proportionably diminished or increased. For the first three days or so, the bowels should be cleared of morbid secretions and accumulations by Ol. Ricini 3 i, or if necessary 3 ij, every morning: afterwards, its administration every second morning is generally sufficient. If, from the first, the bowels be very loose, that is, moved four or five times a day or upwards, the proportion of Cretæ Præparata should be increased to gr. v or vi, the dose of castor oil should not, if possible, exceed 3 i, or it may be wholly replaced by an emollient lavement; and a warm bath, which has a highly soothing effect on the irritated or inflamed mucous membranes of children, may be employed once or even twice a day. In proportion as the evacuations became less mucous and green, the powder should be less frequently given, as twice, and eventually once a day, a diminution which can ordinarily be commenced within a week. The Hydrarg. cum Cretâ should be wholly omitted at the end of a fortnight, lest it induce ptyalism; but it may be resumed in three or four days, if required, provided its constitutional effects have not been manifested on the gums. The object and action of the above medicines are as follow:—The Hydrarg. cum Cretâ is alterative and aperient; the creta præparata is useful as an antacid absorbent, which does not form an aperient compound. Some are in the habit of conjoining with them gr. ij to iv of Sodæ Carbonas Exsiccatus as an antacid (the dried form being preferred merely because less bulky); but we have satisfied ourselves that, by making an aperient compound, it purges and gripes. Many are in the habit of giving calomel instead of Hydrarg. cum Cretâ. We do not object to an occasional dose, especially in older children, when the body is costive and not likely to yield to Hydr. cum Cretâ; but we entertain strong objections to it as an habitual purgative or continued alterative, because it often occasions violent irritation, inflammation, and occasionally invagination—evils which the practitioner erroneously ascribes to the severity of the disease. One of the greatest improvements, indeed, in the modern treatment of children, consists in the banishment from practice of the immoderate use of calomel, jalap, scammony, and other drastic purgatives, under the circumstances in question; as the disease, though often disguised under the inappropriate appellations of infantile remittent fever, worm fever, weaning brash, thrush, &c. is really only various degrees and forms of active congestion and acute or chronic inflammation of the mucous membrane of the alimentary canal, a disease always exasperated by active purging, stimulants, and narcotics, and as constantly relieved by mild antiphlogistic treatment and alteratives.

The object of the castor oil is to sweep away the morbid and acrid fæces, which are more irritating than the aperient used for their removal: but the latter would also irritate if exhibited in too large and frequent doses: therefore emollient lavements are employed as a soothing auxiliary. In young infants, if magnesia will suffice, it is preferable even to castor oil. Colic pains, indicated in infants by sudden screaming and retraction of the legs, are seldom experienced in any considerable degree when the above mild treatment is pursued;

but they are common when pungent irritating aromatics (as the Pulv. Cretæ Co. instead of Creta Præp.) are given, with the mistaken view of obviating them. When violent, they require to be relieved, and we have found no medicine answer this object more safely and effectually than the following prescription of the late Dr. Hooper, employed in the St. Marylebone Infirmary:—R. Magn. Carb. ʒj, Tinct. Card. Co. ʒxx, Aq. Anethi ʒss. Of this one or two tea-spoonsful may be given to infants eight months old, once or even twice a day, when there are violent returns of pain. The tincture should be omitted if there be inflammation, or even considerable irritation, of the mucous membrane, indicated by frequent mucous evacuations. Warm fomentation and the warm bath are well known auxiliaries in all cases of colic. *Diet*, meanwhile, requires the most rigorous attention; if this be neglected all other means are unavailing. It should be constantly kept in mind and impressed on those to whom the care of infants and children is entrusted, that unsuitable feeding—giving food too often, solid food too soon, and inappropriate food at all—is the prolific parent of half the maladies of infants and young children. An infant at the breast, affected with the precursory symptoms in question, should be stinted in diet: though suckled at the usual and proper intervals of two and a half, or three hours (with an interval of five hours during the night), it should not, as usual, be allowed to satiate itself. If fed by the hand, its diet should be entirely liquid, and should invariably be sucked out of a bottle, through a leather or perforated parchment, yielding it so slowly as to require about three acts of suction for every one of deglutition—a process which, as it is adopted by the infant at the breast, is accordant with nature, and explicable on sound physiological principles. Asses' milk generally agrees best with young infants; but, in its absence, two parts of barley-water or of water arrow-root with one of milk (increased to half as the infant improves), forms the best substitute. When convalescence is well advanced, and the infant is emaciated, the liquid food may be thickened twice a day by a rusk, pulverised and reduced to jelly by affusion of boiling water, which may afterwards be partly removed by pressure through linen. “Farinaceous” foods are suspicious; as they generally consist of bad arrow-root made worse by adulteration with potatoe-starch, &c.

Infants, and children above the age of a year and a half, who, from having double teeth, had previously been allowed to partake of solid food, should be reduced to a liquid farinaceous and milk diet. The practitioner will find great difficulty in stemming the importunities of friends and nurses to countenance a premature increase of diet before the bowels are restored to a healthy state, the appearance of “weakness” being, to lookers on, the most alarming of all symptoms. Duty as well as common sense requires the medical man to be inflexible.

When the infant or child is sufficiently well to go out, it should have abundance of fresh air; and, even in cold weather, this may be permitted to a much greater extent than is commonly imagined, provided the child be sufficiently clothed. There is no species of pampering worse than that which confines a child to the house on a cold day, when a layer of flannel would not only render him as independent as the wind which he dares not face, but would protect him from that constant chilliness within doors, the sedative influence of which is even more pernicious than temporary exposures without. That young animals do not thrive well, and that they exhibit a great mortality, when unduly exposed to cold, has not only been demonstrated by the direct experiments of M. Edward, but might be proved, in opposition to popular prejudice, by reference to the statistics of the poor, as indeed has been shown by the statistics of M. Quetelet, in reference to about 600,000 cases. Plague, pestilence, and famine, have not perhaps slain more than attempted “case-hardening.”

But though adequate clothing will enable children and elder infants to go out in most weather, this does not apply to infants under six months old. The mere inhalation of very cold air in severe winter weather is injurious to them,

and unless the face be kept covered with a strong double veil, they are safer in warm airy rooms within doors.

By the means now indicated, the precursory symptoms of inflammation of the brain may almost always be averted; and if infants be well managed from the first, such symptoms will comparatively seldom appear. Early attention to them is especially requisite in families where hydrocephalus has already prevailed, and in instances where a child has received a blow on the head. In conclusion, if the cerebral symptoms should fail to be speedily relieved by the above treatment, the practitioner should examine, and balance with the utmost care, whether he may not resort to bleeding and other antiphlogistic measures, on the assumption that inflammation has actually taken place. This diagnosis is sometimes one of the most delicate in the practice of physic. The pathognomonic symptoms are detailed under *Diagnosis of Inflammation of the Brain*.

I. INFLAMMATION OF THE DURA MATER.

This is very rarely a primary or idiopathic affection. Dr. Abercrombie, for instance, records only a single case of the disease in this form. It is generally secondary, and produced by disease of the cranium extending inwards, or abscess of the brain extending outwards.

1. One of the most common forms of disease of the cranium is dependent on ulceration of the bones of the ear, occurring principally in scrofulous children subject to a discharge from the ear, or to cutaneous sores around it. The ulcerative process, penetrating the bones, at length reaches the dura mater, excites chronic inflammation, sometimes implicates the arachnoid and pia mater, occasioning meningitis, mostly chronic, and then attacks the brain itself, and occasions abscess. It may be known that the disease commences in the ear by the purulent discharge taking precedence of the cerebral symptoms. But there is another, though less numerous, class of cases, in which the disease commences in the brain, and, penetrating through the membranes, extends to the ear. These may be known by deep-seated pain and other cerebral symptoms taking precedence of the purulent discharge from the meatus externus.

2. Disease of the nose, attended with ulceration of the æthmoid bone or frontal sinuses, and a purulent discharge, is another form of disease of the cranium, which may produce the same effects as disease of the ear; and here, likewise, the affection of the nose is occasionally secondary to abscess of the brain.

3. Disease of any other part of the cranium, as, for instance, that resulting from syphilis treated by an excess of mercury, may produce a similar train of consequences; and several instances are on record in which such disease caused inflammation of the longitudinal and lateral sinuses, with coagulation of their blood, suppuration of the coagulum, and fatal suspension of the cerebral circulation.

4. External violence may occasion inflammation of the dura mater by injuring or fracturing the bone. If, however, the blow produce concussion only, it does not follow that the dura mater shall be injured; for experience shows that it is more commonly the cerebral substance itself which suffers: abscess is frequently the result, and it may be seated remotely from the situation of the blow, though usually in one of the lines of direction in which its force has been transmitted through the brain.

The *symptoms* of inflammation of the dura mater are very diversified, in consequence of the affection being variously complicated by inflammation of the arachnoid and pia mater and of the substance of the brain itself—complications which may impart acuteness and activity to the disease in proportion to their nature and extent. As a general rule, however, inflammation of the dura mater is insidious and rather slow in its progress, exhibiting the phenomena of partial acute, or even of chronic cerebritis, rather than of meningitis. For instance, when the disease originates in the ear, the patient generally expe-

riences pain, which is for several days regarded merely as an ordinary ear-ach. If discharge of matter, often foetid, take place, the practitioner is disappointed at finding that the pain, so far from being relieved by it, continues unabated, or even increases in violence. The patient becomes oppressed and drowsy, then slightly delirious, often with shivering, and at last comatose. In other cases, there is no discharge of matter; but the patient, after complaining for a day or two of deep-seated pain in the ear, becomes restless and forgetful, lies rolling his head from side to side, or tossing about his arms, and in a short time sinks into coma. In other cases, again, the affection supervenes upon a sudden cessation of a purulent discharge from the ear, perhaps of some standing (such as that which often follows scarlatina), or which may even have subsisted for many years. The sudden disappearance of the discharge, in these cases, is followed by pain in the ear; this, by languor and drowsiness, and in a few days by coma. The pulse is in some cases frequent, in others natural, and in others again below the natural standard. (*Abercrombie.*) When the pulse is quick and the case comes to a fatal termination within a week or two, more or less extensive inflammation of the arachnoid and pia mater may generally be expected; whereas, when there is little fever, and the case is protracted through several weeks, the disease, whether confined to the membranes or implicating the cerebral substance, will generally prove to be local and circumscribed.

The symptoms now described apply equally to inflammation of the dura mater when originating in the nose. Pain in the forehead, with purulent and often most offensive discharge from the nose, sometimes of many weeks' or months' duration, is at length followed by forgetfulness, delirium, and fatal coma, with or without fever and convulsions.

When inflammation of the dura mater originates in spontaneous disease of other parts of the cranium, the symptoms are essentially the same, but in their commencement they are more obscure and doubtful, because there is no discharge or other external circumstance affording a clue to the nature of the affection. The difficulty is less when there is any lesion of the scalp, and still less after a blow on the head.

From all that has now been said, the practitioner will see the importance of regarding even the slightest ear-ach with suspicious distrust, in reference to its possible consequences, especially if it be attended with an offensive purulent discharge of some duration, indicating deep-seated otitis, and still more if that discharge be suddenly suppressed. He will anxiously guard against inflammation of the brain, and watch for the first manifestation of cerebral symptoms. The same remarks apply to deep-seated inflammation of the nose with ozena, and of the eyeball or socket—an occasional, though more rare, source of inflammation of the dura mater.

II. MENINGITIS.

Before entering upon this subject, it is necessary to ascertain explicitly to what membranes this term meningitis properly applies; as, on this point, some writers appear to us to have entertained inaccurate ideas, and to have refined beyond the limits of ascertained facts.

MM. Lallemand, Parent, and Martinet, have described inflammation of the membranes of the brain under the designation of *arachnitis*, contending that it is to the lesion of this membrane that the symptoms are due. We cannot subscribe to this opinion. We believe that the symptoms are referrible, as much, nay probably more, to co-existent inflammation of the pia mater, and, in many instances, of the surface of the brain itself, than to that of the arachnoid membrane alone; and we entertain this opinion, not only from much personal observation, but from an examination of their own cases and many others on record. M. Georget, analysing the cases of MM. Parent and Martinet, says, that in almost the whole the arachnoid membrane was only slightly altered, especially if compared with the alterations of the pia mater and brain. For instance, the writers avow that, out of 117 cases, 48 presented alterations of the

cerebral substance; also, that the redness of the arachnoid was ordinarily confined to *a few points* of the convexity, or the base. Out of 52 cases, taken without selection out of the whole number, and particularly analysed by Georget, five only presented pus on the free surface of the arachnoid: on the other hand, in 32 instances, the pia mater was injected, and infiltrated either with blood, or with serous, sanguinolent, sero-purulent, or purulent fluid, even to the bottom of the convolutions; 26 times the brain was softened, partially or generally; 13 times it was injected and speckled (sable) with blood, or infiltrated with this liquid, or very dense, &c. Again, most of Lallemand's cases of inflammatory softening of the brain are said to be complicated with *arachnitis*. But what is the *arachnitis* of which he speaks? It ordinarily consists of injections of the pia mater with blood, its infiltration with serous or purulent fluid, and its adhesion to the surface of the brain! Again, of six cases of *chronic arachnitis* recorded by Bayle, the only alterations of the arachnoid were, that divers points, especially of the convexity, were thickened, opaque, resistant, and whitish; whereas, there was serous effusion into the cavity of the arachnoid or into the ventricles, in all six; adhesion of the arachnoid (he means the pia mater) to the surface of the brain, which was softened so as to tear off with the arachnoid, in five; local alteration of an hemisphere, in one; pia mater red, injected, infiltrated with serum, in five; false membrane on the arachnoid, in two. Thus, in five of these six cases of reputed *arachnitis*, the pia mater was diseased, and in all six the surface of the cerebral substance was seriously injured! Again, we have analysed the 16 cases of meningitis given by Abercrombie, and in all these was disease either of the pia mater, or of the surface or interior of the brain, or of both pia mater and brain; while the lesions of the arachnoid were comparatively insignificant. The cases of Gölis, of Morgagni, and many others that we have examined, present much the same results.

It, therefore, appears that injection or infiltration with blood, and serous, sero-purulent, purulent, and false membranous effusions, are incomparably less frequent and considerable in the arachnoid membrane than in the pia mater; and that disease of these membranes is very frequently accompanied with serious disease of the surface, and often of the interior of the cerebral substance. It is, consequently, a gratuitous assumption, wholly opposed by facts, to say, that the symptoms, in these cases, are wholly, or even principally, referrible to the state of the arachnoid membrane; and it is equally unsupported by facts to say, that *arachnitis* can be distinguished by symptoms from inflammation of the pia mater. For these reasons, we shall treat of the inflammation of these two membranes conjointly under the name of *meningitis*; and in doing this we are not singular, the same having been done by Abercrombie, Guersent, Quain, Copland, and most other recent writers.

Another question arises as to whether meningitis can exist without exciting inflammation, or irritation, of the surface of the brain. We are disposed to think that it cannot; and this opinion is substantiated equally by a consideration of the physiology of the membranes, by morbid anatomy, and by symptoms. The distribution of the blood-vessels to the brain, as has been well pointed out by M. Georget, is peculiar. All other organs are more or less spongy and areolar; their vessels can penetrate them by trunks and branches; they are not enveloped in a vascular membrane like the pia mater; they need it not; the whole of their vascular system exists in their interior. But the brain is not spongy and areolar; no cellular tissue is there discoverable; its vessels cannot penetrate it by trunks and branches, nor even by twigs; they must penetrate it on every side, after having ramified and subdivided *ad infinitum*, on its whole surface, where they are sustained by cellular tissue, and disposed in a vascular membrane, which forms the immediate and universal envelope of the organ. Hence, as the membranes and the contiguous cerebral substance are supplied by the same vessels, it is impossible that inflammatory action occurring in the one should not affect the other, either by an extension

of the inflammation itself, or by a propagation of its irritative influence. Now, this is precisely what is demonstrated by morbid anatomy. In the bulk of the cases already quoted, it has been seen that the surface of the cerebral substance visibly participated in the inflammation of the membranes, and the increasing accuracy with which *post mortem* examinations of the brain are now conducted, brings the connection in question more frequently under observation than ever. Enlarged vessels penetrating the cineritious substance are now discerned which were formerly overlooked; and increased redness and softness of that substance are now appreciated as morbid, which were formerly supposed to be healthy. Symptoms bring us to the same conclusion. There is acute pain, and there is high inflammatory fever, in meningitis, precisely as in inflammation of any other important serous membrane. But this is not all; there is likewise disturbance of the functions of the brain itself; there is perversion or abolition of the intellectual faculties, the external senses and the muscular powers; there is delirium or coma, convulsions or paralysis; and it is principally these morbid phenomena, exhibited by the brain itself, which constitute our indirect or intermediate guides to the detection of inflammation of the membranes; without them, it displays itself as little more than a febrile headach. The general truth of what has now been stated is not invalidated by occasional exceptions, occurring more especially in the aged, in whom morbid changes of the membranes are sometimes found after death, though the intellect, the senses, and the muscular powers, had not been materially deranged during life.

If, then, the symptoms of meningitis be principally those of disturbed function of the brain, is it possible to distinguish it from inflammation of the brain itself? Dr. Abercrombie, indeed, resolves this question in the negative. "Our knowledge," says he, "is not sufficiently matured to enable us to say *with confidence* what symptoms indicate inflammation of the substance of the brain, as distinguished from that of its membranes." M. Georget is so strongly of the same opinion that he treats meningitis and cerebritis as a single affection. We cannot however, subscribe to the opinion of these able writers. Observation and numerous *post mortem* dissections lead us to think that, when extreme cases of the two affections are selected for consideration,—when we place, on the one hand, meningitis with the least possible degree of inflammation of the surface of the brain, and on the other, cerebritis not implicating the membranes, the difference between the symptoms is so marked, that the diseases can scarcely fail to be distinguished from each other by a discerning practitioner. But when the two affections co-exist, the one will so far modify the other, as in a great measure to neutralise the characteristic symptoms of each. Yet the compound or intermediate character of the symptoms in such cases will sometimes indicate even the double affection, and a predominance of the one or the other may occasionally be inferred from the preponderance of its particular symptoms. We are far, however, from supposing that these latter distinctions can be formed with certainty. The utmost length to which it is possible to go, is, to establish more or less strong probabilities. Entertaining these views, we shall treat meningitis and cerebritis as distinct affections, and endeavour to point out, under each, the manner in which it is modified by the co-existence of the other. In this way, the compound affection, which is of far more frequent occurrence than either in the independent form, will, we think, be rendered more intelligible than if it were treated separately as a distinct variety. In this view we are countenanced by an analogy derived from the lungs. Pleurisy and peripneumony are always treated of separately; whereas, pleuro-peripneumony is not.

We now, then, proceed to treat of meningitis, repeating that this term is applied to inflammation of the arachnoid and pia mater conjointly, since the two membranes are almost always simultaneously affected, and the symptoms are not distinguishable during life.

Meningitis may be — 1. acute, and 2. chronic.

1. *Acute Meningitis.* The symptoms present varieties, according to the part of

the membranes which is the principal seat of the inflammation; according to its extent, its rapidity, the degree of its complication with cerebritis, the age, and the previous constitutional state of the patient. We shall first present the symptoms of the most common form, and subsequently point out the peculiar features of the several more important varieties.

Precursory symptoms. These, as occurring in infants and children, and likewise in adults, have been already described. When the inflammation actually commences, there is sometimes more or less of a cold stage, indicated by chilliness or decided rigors, with cutis anserina, and paleness; then comes reaction, with fever, and the following symptoms:—

Symptoms of meningitis of the superior surface of the hemispheres. We assume this as the type, because it is the most common form in adult subjects, though it occurs also in children. MM. Parent and Martinet, Guersent, Cheyne, and other practical writers, indicate three stages, presenting different groups of symptoms. Any one of these stages, however, may be absent under circumstances which we shall explain as we proceed. They may also coalesce or alternate.

The *first stage* is characterised by symptoms of increased cerebral excitement and exalted sensibility, dependent on augmented vascular action, short of the degree producing compression; and it must be recollected that in most cases the inflammation, and in all, its irritative influence is propagated to the contiguous surface of the cerebral substance. The head is attacked with pain of the acute kind, often darting from part to part. It is referred principally to the forehead, temples, vertex, or occiput; and is attended with violent throbbing, felt more especially in the same parts. There is often also a feeling of diffuse tension and constriction around the forehead. The pain, though incessant, sustains exacerbations at brief intervals, which elicit from children a peculiar scream, well-known to observers as highly characteristic of cerebral inflammation. After uttering this, the child either relapses at once into a drowsy state, in which he grinds and gnashes his teeth, or for a time rotates his head on the pillow, and saws the air with his arms, exclaiming “Oh! my head.” The head, in children more especially, always seems heavy, since it falls back, as if by its own weight, when the patient is raised. There is usually vertigo. The head is hot, with diffused redness and more or less turgescence of the face; but sometimes the flush is observed during the paroxysms of pain only, paleness prevailing during the intervals. The degree of colour depends mainly on the natural complexion of the patient, whether florid or pale, and plethoric or not. In all cases, whether of adults or infants, the countenance presents an anxious expression, indicative of suffering. The eyes are often blood-shot, and there is great impatience of light, with frowning in infants and children: to avoid it, indeed, the patient generally lies with the eyes shut, and impatiently resists every attempt made by the practitioner to raise the eyelid, even during sleep. The pupils are sometimes very much contracted, probably from the great sensibility of the retina, and sometimes they oscillate between contraction and dilatation; but decided dilatation does not supervene till the next stage, when compression becomes more considerable. The ears are affected with tinnitus, and are so impatient of sound that the noise even of a light step in the room is sometimes intolerable. The muscles sometimes present slight twitchings of the face and eyelids; but it is seldom before the second and third stages that we see considerable convulsive and paralytic affections. To this, however, there is one important exception in the stomach; for it rarely happens, especially in infants and children, that vomiting does not occur from the first; and it is apt to continue, sometimes at considerable intervals, but in children, often almost incessantly, during this and the following stages. In infants, we have often found it the first suspicious symptom, and therefore think that its cause should always be scrutinised with especial care. That this vomiting is cerebral, and not gastro-enteritic, is proved by the absence of pain and tenderness on pressure in the epigastrium, and of redness of the tongue, unless there happen

to be a gastro-enteric complication. Even in this case, the vomiting is not so obstinate and frequent as in the cerebral affection. The mind evinces increased irritability; the manner of the patient being abrupt and hurried, and his answers brief, quick, and impatient. This state is compatible with somnolency, when he is not aroused; and such is particularly the case in children; but in adults, the somnolency usually passes into constant wakefulness; and delirium, supervening with more or less rapidity, at length attains a high, and sometimes a furious, degree of violence.

The symptoms hitherto detailed are principally connected with the functions of the brain; we now proceed to notice those dependent on the symptomatic fever. This fever, as resulting from inflammation of a serous membrane, is more or less violent, except in aged persons and feeble constitutions. The pulse is frequent, and it is usually full and hard, unless the subject be weakly or anæmic, when it is sharp. The respiration is accelerated very much in proportion to the speed of the pulse; but even at this early period, it often begins to exhibit the peculiarity of being irregular and suspirious, and therefore slower than would otherwise accord with the pulse, the long sighs seeming to replace a greater number of brief respirations. Moaning not unfrequently attends the long expirations. The skin is hot and dry; the tongue is whitish, with clamminess and thirst; the bowels, in the generality, are obstinately costive, unless there has been a previous inflammatory diarrhœa, which is not uncommon in children. The evacuations are usually dark and offensive, but "spinage stools" are not, as is supposed by old writers on hydrocephalus, either peculiar to, or characteristic of, cerebral inflammation. The urine is scanty and high-coloured, and in children, Guersent remarks, it is very sedimentous, from the large proportion of calcareous salts which it contains; as happens, indeed, in all diseases in which they void it seldom. Such are the symptoms of the first stage of meningitis of the upper surface of the hemispheres.

Second stage. After the foregoing stage of excitement or exalted sensibility has subsisted for a period varying from one to three or four days, it is followed by the opposite condition, or of depression, with diminished sensibility, constituting the second stage. Of this it may be premised, in general terms, that it is more characterised by muscular affections, the convulsive class being dependent on cerebral irritation, which attains its maximum in this stage, and the paralytic class being referrible to cerebral compression, which supervenes a little later. It must be remarked, however, that convulsive affections are most prevalent in inflammation of the base and ventricles of the brain, which in children frequently complicates meningitis of the convexity of the hemispheres. The symptoms of this stage in their order are as follow:—The delirium passes into drowsiness, and eventually into more or less complete coma. Though the headach continue, delirium or coma prevents it from being a subject of complaint, yet children continue to scream and toss the arms, as if instigated by pain. The flushing and heat of the head often continue through a considerable part of this stage, though the rest of the body become chilly; but they eventually give place to paleness, coldness, and sinking of the features. The eyes become morbidly insensible to light; the pupils continue to oscillate between contraction and dilatation; but, as the coma advances, the dilatation becomes predominant and finally constant, contraction not being excited by the strongest light. Mr. Grainger is of opinion that immobility of the pupil indicates abolition of the "excito-motory" function by compression of the medulla oblongata; but that, when mobility remains, yet the patient is blind, the excito-motory function is perfect, but the sensitive function of the brain abolished. There is strabismus, especially in children, with rolling of the eyeballs, or distortion upwards or outwards, by the tonic action of the superior oblique, or the abducens; there are also double vision and other optical illusions, and sometimes total blindness. The eye itself, as the stage advances, becomes pale, dim, and sunk. Morbid acuteness of hearing is commuted for dulness or deafness. The muscles of the

face and limbs are affected with convulsive twitchings and subsultus tendinum; sometimes there are convulsions of one set of muscles and imperfect paralysis of another, and occasionally convulsions and paralysis alternate in the same limb. As coma becomes complete, the convulsive affections are superseded by complete muscular relaxation or paralysis. The pulse, in consequence of cerebral compression or obstructed circulation, not only becomes weak and soft, but it usually, though not invariably, falls to its natural standard or even lower, being at the same time singularly variable in frequency, unequal in force, and liable to great accelerations by any slight exertion, as that of merely being raised in bed. This variability, even many times per minute, is not seen in other diseases, except from transient causes, and is therefore an important and striking characteristic of inflammations of the brain. With this state of the pulse, the respiration also becomes remarkably irregular, unequal, and sighing, the long sigh being sometimes followed by still longer pauses, and these again by a number of brief quick respirations. We have seen fifteen or twenty slow respirations alternate with as many quick gasping ones, with the utmost regularity for hours together, in comatose children; and we imagine that, during the slow respirations, pulmonary congestion takes place, and is relieved by the subsequent quick respiration, precisely as we have elsewhere shown to be the case in the last stages of certain diseases of the heart. (See *Treatise on Diseases of the Heart*, by the writer, 3d edit. p. 399.) The temperature is apt to fall in children, if unduly exposed. The tongue becomes dryer and more furred, and the bowels are even more obstinate than before. The excito-motory function being still perfect, deglutition—an act subordinate to this function—is readily, and even greedily, performed, when excited by food well introduced by a spoon into the mouth.

Such are the symptoms of the second stage, which is usually the longest. It not unfrequently lasts a week; and, in weakly scrofulous children presenting the slow form of inflammation, we have seen it exceed a fortnight. It occasionally happens in children, that when the collapse of this stage has reached the state of stupor, but not of complete coma, a treacherous amelioration takes place; the stupor diminishes without wholly disappearing, and the child recognises its friends, and even takes an interest in surrounding objects. All the other symptoms appear to sustain a corresponding improvement. The vulgar call this “a lightening up before death.” After lasting for a day or two, it is followed by complete coma, with screaming, tossing and rolling of the head, convulsions, paralysis, and death.

Third stage. This is little more than an assemblage of the worst symptoms of the preceding stage in their most aggravated form. The coma is profound, and no pain is felt; universal relaxation or paralysis replaces all previous convulsive movements or spasmodic rigidity of the limbs, face, or jaws; the pupils are widely and immovably dilated, with blindness and deafness. Abolition of the cerebral functions is attended with that of the excito-motory, and as this system of nerves presides over the orifices and sphincters of the body, there is the semi-apert eye, stertor, involuntary discharge of the urine and faeces, and difficulty of deglutition, the latter act not being excited except by the introduction of spoon-meat far back into the fauces, and ultimately not at all. The pulse, lately slow, undergoes a remarkable final acceleration, rising to 140, 160, or even 200, with extreme feebleness, but in general with regularity. This is, in fact, the flutter preceding dissolution. The respiration also becomes quick and regular, in accordance with the pulse, but it slackens and sometimes becomes more stertorous during the period of dissolution. The tongue is dry and brown; the lips and teeth are coated with fuliginous sordes; the abdomen is tympanitic; the extremities and general surface become cold; the perspirations partake of the same character; the face is sunk and ghastly; and with this assemblage of mortal symptoms the patient speedily dies.

Remarks on the stages. Though the three stages now described are frequently seen in acute meningitis, it is still more common to find one or more

of them absent or indistinct. The first stage may be absent when, from the rapidity or extent of the inflammation, or the unusual susceptibility of the subject, the disease sets in abruptly, as with a violent and protracted convulsion, followed by comatose and paralytic symptoms. It may also be absent, or at least escape observation, in aged persons, who are less susceptible of high excitement, and in whom, therefore, mental confusion and stupor, with convulsive or paralytic affections, often constitute the first indications of the disease. The subsequent occurrence of fever distinguishes it from mere congestion. Weakly youths or adults are occasionally affected in the same manner. Cruveilhier has described several of these cases under the title of "comatose subarachnoid meningitis," effusion of serum and lymph, &c. being usually found under the arachnoid. We regard such cases as the exception to the general rule, and cannot subscribe to the opinion of this author, founded on a limited number of cases, that stupor, gradually increasing to coma, is the pathognomonic character of meningitis of the superior surface of the hemispheres; while acute pain, exaltation of sensibility, high delirium, and convulsions, are foreign to it.

The second stage may be absent or barely discernible, in consequence of the great extent and rapidity of the disease hurrying it at once out of the first stage of excitement into the last of complete collapse, a violent convulsion not unfrequently occurring during the transition. The third stage may be absent, from violent general convulsions abruptly cutting short the thread of life—an event not unfrequent in children, and which we have several times witnessed in adults. In some instances, again, the stages, during their transition, partially coalesce, so as simultaneously to present the phenomena of both; thus violent fever and convulsions may co-exist with stupor and partial paralysis. In other instances, it occasionally happens that there is an alternation of the phenomena of the two first stages, lethargic collapse being repeatedly broken by paroxysms of excitement, till complete coma is fully established. The causes of these irregularities in the stages are, to a certain extent, explained by varieties in the circumstances of the disease, which we now proceed to notice.

Varieties of acute meningitis. Of these we shall advert to the most striking and appreciable alone.

Phrenitis. When meningitis affects a great extent of the superior surface of both hemispheres, and, still more, if it involve the surface of the brain in the inflammation, and if this occur in a robust adult, the symptoms are apt to be those of violent excitement, with furious delirium, followed by rapid sinking and speedy death—this event sometimes taking place within a day or two, especially if accelerated by convulsions, and generally occurring within a week. This constitutes the variety described by old writers under the designation of phrenitis. Robust, healthy children, under the same circumstances as to the locality and extent of the disease, are apt to be suddenly attacked by violent convulsions, more or less speedily followed by coma and death. Whether in adults or children, the *post mortem* appearances frequently do not proceed beyond increased vascularity of the membranes and grey matter of the convolutions, but sometimes there are effusions of serum, lymph, and pus on the surface, as will presently be explained under the head of morbid anatomy.

Meningo-Cerebritis. Meningitis is sometimes modified by the co-existence not merely of superficial, but of deep and extensive cerebritis, constituting what may be denominated meningo-cerebritis.* Here, the disease is altered in its aspect by the peculiar symptoms of cerebritis. What then are these? Not to anticipate fuller explanations to be given under the head *Cerebritis*, it may be sufficient here to state, that cerebritis is almost always attended with spasmodic contraction of the extremities, alternating with or

* We employ this term because it is descriptive, and therefore definite. *Encephalitis*, used by some writers with the same import, is objectionable, because others, as Bouillard, &c. apply it to cerebritis.

followed by paralysis, partial or general, and more or less complete, symptoms which are not of ordinary occurrence in meningitis of the upper surface of the hemispheres; and that these symptoms, together with coma, supervene at *an earlier period* than in meningitis, because the functions of the brain are more speedily abolished when its interior, as well as its membranes and surface, is affected. Spasmodic and paralytic symptoms are common, it is true, in meningitis of the base and centres of the brain; but here they usually come on late, constituting the second and third stages of what is called hydrocephalus, as will be shown under the next head. These circumstances, therefore, if kept in recollection, will generally be sufficient to indicate the compound disease, meningitis-cerebritis, to the observant and reflecting practitioner.

We now proceed to point out the features characteristic of the *hydrocephalic* variety. When meningitis is confined to a moderate extent of the membranes at the base of the brain, or within the ventricles, and is not propagated beyond a moderate extent into the cerebral substance, we have the most perfect type of the group of symptoms which, in this country, is commonly denominated acute hydrocephalus. Abercrombie refers them to inflammation of the arachnoid membrane of the ventricles and of the contiguous corpus callosum, septum lucidum, and fornix, producing in some cases softening alone of these parts; in others, effusion alone into the ventricles; and in others again, which is the most common case, both effusion and softening. In the majority of our own cases, we have found, in connection with these changes, more or less vestiges of inflammation of the membranes at the base. Parent, Martinet, and Rostan, though less definite in their accounts than Abercrombie, have evidently described the same disease in reference to the same parts.

It occurs principally in children; and those of weakly scrofulous constitutions are the most liable; but it is also occasionally met with at puberty and afterwards. In consequence of the limited extent of the inflammation, it is apt to run a prolonged course of two or three weeks, sometimes, though not always, exhibiting three distinct and well-defined stages.

The symptoms differ from those of meningitis of the superior surface of the hemispheres in the following particulars:—1. They are less characterised by high excitement and irritation; the delirium, for instance, being of a quiet kind, rather a confusion of thought, with forgetfulness, than real delirium; and often so slight as not to prevent the patient, when roused, from answering questions coherently, though slowly, and with an evident effort to rally and concentrate his thoughts. This absence of violence from the delirium is perhaps to be explained by the disease not implicating the grey substance of the cerebral hemispheres, which is believed by many physiologists to be the seat of mental power, and therefore, when irritated by inflammation, of violent delirium. 2. The symptoms are more characterised by somnolency, which is almost continual; by the earlier tendency to more or less complete coma, and by the greater prevalence, in the latter stages, of spasms, tonic and clonic, alternating with partial paralysis, and ultimately superseded by complete muscular relaxation. These pathognomonic features are ascribable to the disease being seated in the immediate neighbourhood of the medulla oblongata and cerebral centres in general; even slight local compression of which, either from vascular turgescence or effusion, suffices to occasion somnolency at an early period; while a higher degree not only occasions coma, but, by irritating the excito-motory nerves, induces spasms. When the compression becomes extreme, or the parts disorganised, the spasms are superseded by complete paralysis. Such are the characteristic features of hydrocephalus.

M.M. Parent and Martinet have shown that arachnitis at the base of the brain is much more common in infants than in adults, and is characterised by a greater tendency to convulsive affections, and less to delirium; whereas, in adults, inflammation of the membranes occurs more frequently in that portion of them which covers the upper and lateral parts of the hemispheres, and is characterised at first by delirium, to which a soporose state, and at length coma, succeed.

It is manifest that, in the former part of this comparison, the writers have described hydrocephalus, and in the latter phrenitis. Although, in our opinion, hydrocephalus is to be regarded only as a modification or variety of cerebral inflammation, and not as an essential or distinct disease, it is proper to state, that a different view is entertained by some pathologists, in so far that while they admit that hydrocephalic effusion originates in inflammation of the membranes or substance of the brain, they think that it may also arise independently of cerebral inflammation in any form or degree. Our limits do not permit us to enter on this question. We return to meningitis in general.

Duration of acute meningitis. It has already been made apparent that, from the diversified circumstances of the disease, its duration is, and necessarily must be, very variable. That of fatal cases, dating from the actual attack, without comprising the stage of precursory symptoms, ranges from two to thirty days; but the most frequent period is between one and two weeks. Thus of 42 cases given by Lallemand, 3 died suddenly, 3 very speedily, 16 between the second and seventh days, 12 between the eighth and twelfth days, 7 between the fifteenth and twenty-first, and 1 at the end of two months. Again, of 116 cases by Parent and Martinet, 66 died between the third and eleventh days, 33 between the eleventh and eighteenth, 17 between the eighteenth and thirty-second days. Cases terminating favourably would probably present much the same results, or the average duration might possibly be shorter, but we have not access to a sufficient number of cases to determine the question. Large numbers like the above convey more accurate information than can be derived from smaller numbers, because, in individual cases, the date of the invasion cannot always be ascertained, ambiguous precursory symptoms or the co-existence of other diseases, as fever, scarlatina, pertussis, &c. throwing obscurity over the cerebral affections. Abercrombie, in his fourth variety, describes cases occurring principally in young persons towards the age of puberty and upwards, which may run on from two to six weeks, the symptoms being at first febrile, with headach, foul tongue, anorexia, and pulse from 96 to 100. They then present ambiguous exacerbations and remissions until, about the twelfth or fourteenth day, the pulse suddenly falls to the natural standard or below it, while the headach is increased, with an evident tendency to stupor. This instantly marks an affection of the head of the most dangerous character, and the patient now lies for several days in a state of considerable stupor, sometimes with convulsions, often with squinting and double vision. The pulse then begins to rise again, and about this time there is frequently a deceitful interval of apparent amendment; sometimes the squinting goes off, and the eye appears quite natural, the stupor is lessened, and the patient appears easy and intelligent, but soon relapses into perfect coma, and dies in three or four days. The duration of the disease is uncertain: it may be drawn out to five or six weeks, or it may be fatal in two or three.

Anatomical characters of acute meningitis. As it is in many cases exceedingly difficult to pronounce whether a given degree of redness in the brain or its membranes is morbid or not, every source of fallacy ought to be studiously avoided. It is therefore incumbent on the student to recollect and take into account that, wholly independent of inflammation, preternatural redness may be occasioned after death—1. by gravitation of blood to the head, when it happens to have lain in a dependent position; and that, even when horizontally placed, redness from gravitation may exist in any part which happens to have been the lowest; 2. by putrefaction causing the blood to transude through the coats of the vessels; 3. by breaking the cranium with a hammer; 4. before death, by retardation of the venous circulation, as from organic disease of the heart, pericarditis or endocarditis with great obstruction in the organ, polypus, great emphysema, suffocation, death during convulsions or tetanus, &c. It must also be recollected, that if the chest and great vessels be opened before the head, the latter is disorged, and its redness diminished the moment that the cranium is divided, as the atmospheric pressure now acts

upon and depletes its vessels, which were kept full on the syphon principle so long as the cranium remained undivided.

The morbid appearances presented by the membranes are the same as those of serous membranes in general; namely, redness and effusions of serum, lymph, and pus, the latter either in the liquid or the concrete form. The dura mater is very seldom inflamed, except from external injuries, disease of the pericranium, or deep-seated disease of the ear, the eye, the ethmoid bone, or the frontal sinuses. Disease of any of these parts may penetrate to the dura mater. We then find pus, either liquid or concrete, between the skull and the dura mater, surrounded by a zone of redness both in the dura mater and the bone itself. In other instances, the dura mater is thickened, tumid, or ulcerated, and generally detached from the bone, and on its arachnoid surface there is a purulent or false membranous deposition, mostly limited, occasionally diffuse. In a few instances of circumscribed accumulations of pus, the dura mater is completely perforated.

The *arachnoid membrane* rarely presents morbid appearances dissociated from the same in the pia mater. To this opinion we are led by personal observation; but the cases of Abercrombie also afford equal data for it, and, in those of Parent and of Martinet, though professedly writers on arachnitis, the lesions of the arachnoid are always confounded with those of the pia mater. The arachnoid is sometimes found finely and minutely injected at a few points of the hemispheres or base, and occasionally within the ventricles, but seldom over a considerable extent in any situation. If the patient has been suddenly carried off in the very earliest stage of inflammation, as by convulsions, the surface of the membrane may also be unusually dry. More commonly, however, the redness of so fine a membrane disappears after death, and we only judge that it has been inflamed by slight thickening and opalescent or milky opacity, observed chiefly on the hemispheres, at the base, and occasionally within the ventricles. When the patient has died in the second or third stages, the free surface of the membrane on the hemispheres, whether injected or not, is found to have effused a fluid most commonly serous; but not unfrequently flocculent and turbid, from an intermixture of lymph or pus. Adherent layers of soft greenish-white false membrane occasionally form on it; but, according to our observation, they are of rare occurrence in this situation. The arachnoid likewise secretes fluid within the cavities of the ventricles, constituting the effusion of acute hydrocephalus. In the slow variety of cases, it usually consists of clear serum; in the more acute, it is slightly turbid, from flakes of lymph or a purulent intermixture; but it is exceedingly rare to see either pure pus or false membranous layers within the ventricles.

The *pia mater*, from its close connection with the arachnoid by cellular tissue, is, as already stated, almost always simultaneously inflamed. It is then more or less highly injected, the slighter degrees being merely ramiform, that is, consisting of distinct arborescent vessels, while the higher degrees are uniform, that is, the interstices are so closely filled up, that intervals are no longer distinguishable. This uniform redness may be either patchy or diffuse, the latter bespeaking a higher degree of inflammation. Sometimes there are also actual extravasations of blood, commonly indeed after concussions; but we have repeatedly seen them under ordinary circumstances. That such redness is inflammatory, may be known by its vivid scarlet tint, the injection being arterial; whereas venous congestion presents the darker tint of venous blood. It must not be forgotten that the latter turns scarlet by exposure for a few minutes to the oxygen of the atmosphere. The pia mater secretes serum, lymph, and pus, into the cellular tissue which unites it to the arachnoid membrane; and these effusions we have found far more frequent in this situation than in any other. Some ascribe them to the arachnoid; but we understand not on what grounds, the pia mater being superlatively the vascular membrane. If the effusion consist of clear serum, it gradually oozes out when the arachnoid is punctured. If the serum be thickish from albumen, instead of oozing out,

it is detained in the meshes of the cellular tissue, and presents a gelatinous appearance, like the vitreous humour of the eye. Sometimes it is hazy or opalescent, in which case nothing but the large veins ramifying between the convolutions can be discerned. Sometimes the proportion of lymph and its opacity are greater in every degree up to the point where they constitute opaque, greenish-yellow false membrane, sometimes even a quarter of an inch thick, and more or less widely overspreading the hemispheres and the base. When the effusion consists of pus (which in this situation is as frequently concrete as liquid), a dead yellow tint runs along the sinuous interstices of the convolutions. These copious effusions of lymph or pus may widely separate the convolutions, penetrating to their utmost depths. Their most common situations are, the vertex and the base, before and behind the crossing of the optic nerves, where the cellular tissue is loose and abundant. The pia mater frequently adheres to the brain, and cannot be detached without lacerating the cerebral substance, which, in such cases, is usually reddened and softened. In scrofulous subjects it is not uncommon to see the pia mater and arachnoid studded with tubercles, varying between the size of pins' heads and peas. Sometimes, by coalescing, they form patches of an inch or more in extent. They follow the membranes between the convolutions, and are also found buried in the grey substance, where we have often observed them to be surrounded by a halo of redness,—generally connected with an enlarged vessel, ramifying from the pia mater. Their most common situation is along the tract of the falx major, especially opposite to the anterior fontanelle if not closed, and at the base. More rarely minute tubercles are found in the white substance of the brain, where they are with difficulty discerned, and therefore often overlooked in consequence of their pale, semi-transparent, yellow tint, contrasting little with the surrounding whiteness. Laennec was one of the first who pointed them out. They may be expected in delicate scrofulous children, who have long been subject to head symptoms, and have finally died of hydrocephalus.

2. *Chronic Meningitis.* This may either be a sequel of the acute form, or it may be primarily chronic. In either case it is obscure from the deficiency of fever, and from the absence, in many instances, of any considerable intellectual disturbance, the only symptoms then being, more or less constant headach, mostly with somnolency, convulsive movements, and in children vomiting. When, however, the disease affects the membranes of the convexity of the hemispheres, M. Bayle, who has attentively investigated this subject, affirms that delirium and progressive paralysis are its inseparable concomitants. The delirium is at first a mere monomania with intellectual imbecility, and often with sullenness, irascibility, taciturnity, and lofty hallucinations; but, sooner or later, it passes into confirmed mania, and this into idiocy. The paralysis is at first slight, incomplete, and partial; but, gradually augmenting and encroaching, it ultimately pervades almost the whole muscular system, renders the gait tottering, and finally annihilates the powers of motion. This state is sooner or later aggravated by spasmodic twitchings and rigid contractions of the limbs; epilepsy follows, and not unfrequently terminates in fatal apoplexy. We have frequently witnessed this series of symptoms in patients under our care in the insane wards of the St. Mary-le-bone Infirmary.

Duration. This is too indeterminate to admit of being defined. When the chronic, is a sequel of the acute affection, its course has appeared to us shorter than that of the primitively chronic form, often terminating within three or four months; while we have known the chronic, in connection with symptoms of insanity, run on for as many years. Either variety may, with or without assignable cause, suddenly become acute, and hurry rapidly to its fatal termination.

Anatomical characters of chronic meningitis. In cases terminating abruptly with symptoms of excitement, we may of course expect to find vascular injection of the membranes and effusions of serum, lymph, or pus; but, in ad-

dition to these, and constituting the characteristic features of the chronic affection, we find the arachnoid membrane in the vicinity of the falx major, thickened, opaque, and its unattached surface roughened by small, irregular granulations of a greyish white colour, commonly denominated glandulæ Pacchioni; but as they are foreign to the healthy condition of the membrane, especially in infancy, they are to be regarded as false membranous products of chronic inflammation. We have in numerous instances found them in scrofulous children, and sometimes in connection with tubercles. We have also seen them follow the line of the coronal suture, when imperfectly united, after the age of two years. The arachnoid membrane thus affected, generally adheres to its reflected layer investing the falx major, especially at the angles of the hemispheres; and at these points we have frequently noticed the inferior surface of the arachnoid, together with the thickened pia mater, to be adherent to the cerebral substance, while the latter, in some instances, was softened or indurated and discoloured. We have repeatedly seen a moderate degree of the same appearances in old persons, though, so far as we could ascertain, they had not presented any material disturbance of the cerebral functions during life; and we lately found the same albuminous granulations, though rather softer, together with thickening and adhesions, in a gentleman twenty years of age, whose father assured us that, though from his youth upwards every slight ailment was accompanied by severe headach, he had not been subject to other more decided cerebral symptoms. He finally died of universal cerebritis, slightly involving the membranes, particularly at the base. In the museum of Professor Monro we have seen a large osseous plate, which adhered to the arachnoid membrane, and overspread the greater part of a cerebral hemisphere; but of the symptoms we are ignorant. From the cases now cited it may be inferred, that slow inflammation may sometimes steal on for years without materially deranging the cerebral functions, and that it may attain the degree of complete ossification, without compromising life. This inference may probably afford *indirect* grounds for another: namely, that when disease of the membranes does disturb the functions of the brain, as in acute meningitis, the disturbance results from the inflammation, or at least irritation, being propagated to the surface of the brain * itself, a doctrine which we have already propounded in the *Preliminary Observations to Meningitis*.

The *causes, diagnosis, prognosis, and treatment*, of meningitis will be postponed till we have treated of cerebritis; when they will be considered at once in reference to all the varieties of inflammation of the brain.

III. CEREBRITIS.

By this term we mean inflammation of the substance of the brain. Let us first contrast its distinctive characters with those of meningitis, in order to make the difference as palpable as possible. We have already shown that in meningitis of the convexity of the hemispheres, the surface of the brain itself is always irritated and generally inflamed; that the consequent disturbances of the functions of the organ are the principal, though *indirect*, signs of the meningitis; and that these disturbances are characterised, as a general rule, by high excitement and irritation, evinced by smart symptomatic fever, headach of the acute kind, great sensibility of the eye and ear, delirium of the more violent kind, and convulsive movements, which, from the usually great extent of the cerebral inflammation, may affect any or all parts of the muscular system simultaneously or in succession, without being restricted to a particular limb or part. Now, in general cerebritis, no less than in meningitis, the functions of the brain are disturbed, but the disturbance is characterised less by excitement than by depression. Nor is this difficult to understand; for

* This, as already stated, is ascribed by some to the grey substance of the hemispheres being the source of mental power.

when the substance of the organ is extensively diseased, the abolition of the function speedily overtakes, as it were, and supersedes any excitement existing in the early stage. Accordingly, though the invasion be attended with fever, quick full pulse, exalted sensibility, &c. as is apt to be the case when general cerebritis is complicated with meningitis, yet these symptoms of vascular excitement are less violent than in pure meningitis of the convexity, and they are promptly replaced by a slow irregular pulse, stupor advancing to coma, and muscular spasms and universal paralytic relaxation. In some cases we have seen universal cerebritis wholly devoid of vascular excitement, and attended with a preternaturally slow, weak, and irregular pulse from first to last. In such instances, when post-mortem examination shows the membranes to have been implicated, we suspect that they had been attacked only secondarily; for, in certain instances of the kind, we have noticed slight vascular excitement, evinced by heat of the head, with quickness of speech, manner, and movements of the eye, to supervene in the mid-career of marked symptoms of depression. It is not, however, to be supposed, that convulsions, whether in the form of mere twitching, or of violent and general fits, are incompatible with symptoms of depression: we have repeatedly seen them in general cerebritis, and they may result either from the irritation of coexistent meningitis, or from counter-pressure on the medulla oblongata—the superior extremity of the “true spinal or excito-motary column.” Besides convulsions, there may be *tonic* spasms, that is, rigid contractions of limbs; and it is maintained by Rostan, Lallemand, Bouillard, and others, that these are peculiar to cerebritis and foreign to meningitis; but their idea appears to extend to the cerebritis of the surface which accompanies meningitis, and it therefore includes the bulk of the cases which we denominate meningitis. However, when the rigid contractions occur in general cerebritis, or in meningo-cerebritis, it is maintained that they are not restricted to a particular limb, side, or part, but affect a variety of parts on both sides at the same time; also, that when the rigid spasms relax, the limb recovers its muscular power and sensibility.

Such are the leading peculiarities of *general* cerebritis; when *partial*, it is said to be characterised by the circumstances that spasmodic, convulsive, and paralytic affections are more limited to particular limbs, corresponding, it is assumed, with particular parts of the brain affected; that the rigid contractions are permanent, with loss of voluntary motion, and more or less impaired sensibility; and that they are finally superseded by complete paralysis. The reason why these symptoms present a more permanent and aggravated character in partial cerebritis, appears to us to be, that, in this, the disease can proceed to a greater extent, even to disorganisation, before compromising life; whereas, in general cerebritis, or meningo-cerebritis, the patient necessarily dies or recovers before the inflammation can proceed to a disorganising extent; whence the spasmodic contractions are comparatively slight and transient.

The preliminary observations which we have now offered are perhaps sufficient to afford a clue to the otherwise complex and embarrassing symptoms of the several forms of cerebritis, which we now proceed to notice.

The disease may be *acute*, and this may be either *general* or *partial*; or it may be *chronic*, and this is always partial.

1. *Acute General Cerebritis.* Though general cerebritis, like meningitis, may commence suddenly, it is more commonly ushered in by *precursory symptoms*. These have been already described under the head of *Cerebral Determination and Congestion*. General cerebritis is usually complicated with more or less of meningitis, and we have already glanced at it as a variety of meningitis, under the denomination of *Meningo-Cerebritis*. The symptoms of high excitement dependent on the meningitis are greater in proportion as this is more extensive, and takes precedence of the cerebritis. Thus, after a rigor, there may be acute and extensive or throbbing headach; flushing, heat, and intumescence of the head, intolerance of light and sound, with redness of

the conjunctivæ, staring prominence of the eye-balls, and contraction, with oscillation of the pupils; more or less violent delirium; pulse quick, full, and hard. In connection with these symptoms, the train of muscular phenomena soon come on. Sometimes there are paroxysms of general convulsions, which for the time aggravate all the other symptoms, suddenly raising the pulse to 130, 140, or 150, with a corresponding acceleration of the respiration. In a few instances, a fit of general convulsions marks the first invasion of the disease. In other cases, instead of general convulsions, there are merely convulsions of individual limbs or muscles, in any or all parts of the body, namely, twitchings of the limbs attended with subsultus tendinum, twitchings of the face, rolling of the eyes, tremor, or violent movements of the tongue when protruded, and in children vomiting. In addition to these *clonic* spasms, there may also be *tonic*, that is, rigid contractions of the muscles. They often follow general convulsions, affect some of the muscles or limbs on one or both sides of the body, occasionally cause strabismus, may change their situations without necessarily leaving paralysis, and may be attended with such pain as to elicit cries on any attempt to extend the limbs, or even to change the posture of the patient.

The symptoms now enumerated are, from the greater extent of the disease, generally more rapid in their progress than when resulting from mere meningitis. In the space of from twelve to forty or fifty hours, they may be superseded by the stage of coma and collapse, and this may be a result of compression by vascular turgescence alone, before effusion has taken place. Stupor and coma now rapidly come on, attended with unconsciousness of pain, and diminished or abolished sensibility of the eye, ear, and other senses. The spasms, both clonic and tonic, are superseded by more or less complete paralysis, or general relaxation. The eye may be distorted from paralysis, instead of the previous tonic spasm, and the eyelids may fall; the pupil is dilated, and the mouth may be drawn awry in consequence of paralysis of one side of the face. The pulse becomes slow and irregular, but at last exceedingly rapid and weak; or, when the transition from the stage of excitement to that of complete collapse is sudden, this rapid state of the pulse may supervene at once without intermediate slowness. Next come relaxation of all the sphincters, the sunk Hypocratic face, coldness and clammy perspirations of the surface, and soon afterwards the fatal termination. In the majority of cases this event occurs within a week, and it may occur even within twelve hours, especially from violent general convulsions. It is very intelligible that so extensive an inflammation should be incompatible with any considerable prolongation of life. The disease is seldom found, after death, to have advanced beyond the state of vascular congestion.

Such is the usual train of symptoms when meningitis complicates the cerebritis. But when the cerebritis takes precedence, becomes general, and only tardily and partially extends to the membranes, the symptoms of excitement may be in a great measure absent. Though the pulse in some instances ranges between 70 and 80, it generally does not exceed its natural standard, but, on the contrary, falls below it to 60 or 50, with remarkable variations of the speed several times per minute. At last only, during the moribund period, it may rise to 120, or thence to 160, with the usual smallness, weakness, and regularity. In connection with this slow state of the pulse from the first, to which we would strongly draw attention, lest it should throw the practitioner off his guard, there is acute and deep-seated headach, which patients mostly describe as shooting from the centre to either temple, the eyes, the ears, or the vertex. There is a feeling and look of much oppression, the patient being sullen, and unwilling to be disturbed. The face is, in general, rather pale, though it may flush occasionally; there is sometimes, though by no means always, slight intolerance of light and sound, with contraction of the pupil; occasionally there is vomiting. Delirium comes on at an early period, but it is slight and observed principally while the patient lies in a dozing state, during which he

mutters incoherently; yet, when roused, he can talk sensibly, though often with a slow, hesitating, and stupid air, from confusion of thought and remarkable forgetfulness of particular words. Occasionally there is an unnaturally quick, stammering accent, a quick movement and winking of the eyes, and a general quickness of demeanour. This delirium may fluctuate in degree from day to day, each amelioration exciting hopes in the practitioner and friends. After subsisting for about five or six days, it passes into more or less coma, which may be fatal in a period varying from twelve hours to three or four days. Occasionally the patient is carried off (sometimes by convulsions), though still able to answer questions distinctly till a very short time before death. This series of symptoms has been accurately described by Abercrombie as his fifth variety of inflammation of the brain, but he does not specify the particular lesion with which it is connected. We have found such cases present after death universal vascular injection of the cerebral substance, with an incipient, and often limited, affection of the membranes, especially at the base.

We know not whether a variety added by M. Gendrin is referrible to the same cause; but, from its insidiousness, it is highly worthy of attention. It often steals on without headach or fever. There is chiefly observed a certain obscuration of the mental functions, accompanied by lassitude and an appearance of mental depression. The patient seems scarcely to comprehend what is said to him,—asks the same questions several times in succession, and answers questions put to him with slowness and hesitation. He complains of little beyond a general feeling of being indisposed; and thus the symptoms creep on gradually, with disturbed sleep and slight rigors, till they pass into slight delirium, and at last into coma; the pulse, which was at first not affected, becoming rapid as the disease advances.

2. *Acute Partial Cerebritis.* The *premonitory symptoms* which forbode partial cerebritis more especially, whether acute or chronic, are deep-seated, fixed, and protracted pain in one part of the head; numbness, creeping, or tingling, with weakness, and sometimes with pain, in one half of the body, or in one extremity, or a part only of an extremity, even a single finger, or in any other set of muscles; the speech, for instance, is sometimes thick, trailing, stammering, or hesitating; or one or both eyes are distorted. The sight and hearing may be impaired or perverted, the memory deteriorated, and the mind occasionally confused. These symptoms, with general deterioration of health, may have been present for weeks, months, or even a year or two, and they are often erroneously ascribed to nervousness, dyspepsia, anæmia, gout, &c. which may produce many of a similar kind.

Symptoms. The aspect of partial acute cerebritis is so diversified, that it is difficult to seize its prominent lineaments. From personal observation, however, and the examination of many cases, we think that, speaking in general terms, the characteristic symptoms are headach, suddenly followed by violent convulsions, either general or partial, with or without rigid contractions of the limbs, coma and paralysis finally supervening, and the fever and delirium being throughout of a mild character.

The following more particular account of the symptoms will, we think, apply to a large proportion of cases. After, but sometimes without, headach and the other precursory symptoms enumerated above, the patient is suddenly and unexpectedly seized with violent general convulsions, which may be either immediately succeeded by coma, ending fatally in two or three days, or may recur very frequently for a day or two, the patient during the intervals complaining of headach, and may then pass into fatal coma. In these fearfully severe cases, the inflammation may not have affected more than a very limited portion of the cerebral substance, as an inch or two, and it may not have advanced beyond the state of simple inflammatory congestion. The disproportion, therefore, between the violence of the symptoms and slightness of the structural lesions must be referred either to the intensity and rapidity of the inflammation (for experience shows that even a slight lesion, if suddenly developed, may create

great functional commotion), or it must be ascribed to the lesion affecting a peculiarly important part of the brain, as the medulla oblongata, or its vicinity. In some cases the progress of the disease is less rapid than in the preceding instances; for the coma completely subsides after ten or twelve hours, and the patient proceeds satisfactorily for several days, when there is a sudden return of convulsions followed by fatal coma. In still less acute and rapid cases the convulsions, instead of being general, are hemiplegic, or even confined to a single limb; and sometimes there are no convulsions, but an attack of coma, as if from apoplexy, followed by permanent tonic spasm; that is, rigid contraction, mostly with pain, of a particular limb or set of muscles. The contracted state, usually that of flexion, is owing to the predominant power of the flexor muscles. In a few rare instances tonic and clonic spasms alternate for a time in the same limb, and in other instances we see spasms on one side of the body with paralysis of the other. During the continuance of these states of the muscular system, there may be a degree of intellectual confusion, forgetfulness and sluggishness, vision of one or both eyes may be impaired or lost, hearing may be similarly affected, and the pupil may be contracted, or dilated and sluggish. There may be heat of the head, but the fever throughout is very moderate, the pulse seldom rising above 70 or 80, and sometimes remaining at, or falling below, its natural standard. Dissections show that up to this period the disease may not have proceeded to softening; but after the lapse of a few hours, or days, the attacks of comatose insensibility or convulsions recur, and are ultimately followed by relaxation of the tonic spasm and complete paralysis, denoting the advance of the disease to softening and disorganisation. The patient dies either in one of the fits, or by gradual sinking. The total duration of such cases may be from five or six days to two or three weeks. If the patient recover, the convalescence may be protracted through several weeks.

Chronic Cerebritis. This, it has already been stated, is always partial. The inflammation is of a slow and often a scrofulous kind: it begins in a small portion of the brain, and extends only very gradually, sometimes occupying many months in its course, independent of the precursory symptoms before enumerated, which most commonly, yet not invariably, precede. The symptoms are much the same in their nature as those of the slower varieties of acute cerebritis when partial; but they are less in degree, and are irregularly scattered over a longer period. Thus the patient may several times, and at various intervals of weeks or months, be attacked with headach and a comatose fit, or with a general convulsion, or a partial spasm, either tonic or clonic, or paralysis, either primary, or consecutive upon the spasmodic affections; and he may recover more or less perfectly from a greater or less number of such attacks. We have seen this occur four or five times over, and it is common for it to occur twice or thrice. During the intervals, the intellectual functions and external senses, one or all, are most commonly somewhat impaired, and the general health is deteriorated. One of the most frequent sequels of the attacks is paralysis, at first perhaps limited to one limb or to any single set of muscles, as those of the eye, whence strabismus; of the face, whence distortion; or of the tongue, whence difficult articulation. This paralysis sometimes extends from part to part by slow progression, whence it has been denominated "creeping palsy." Sooner or later new attacks of coma or convulsions come on, and may either destroy the patient suddenly, when the organic lesion may still not have proceeded beyond the first stage, or inflammatory congestion; or they may leave him to linger for a time in a state of a paralytic exhaustion, when the disease is commonly found to have advanced to softening or abscess, though occasionally it presents the opposite state of permanent induration. Chronic cerebritis is a disease of frequent occurrence in the lower classes of society: at least, we see a very large proportion of the disease in hospital practice. Its frequency is probably referrible to intemperate habits, and to neglect of the precursory symptoms.

Intermittent inflammation of the Brain. It is a well-known, but too frequently forgotten, fact, that inflammations of various organs may assume an intermittent and periodic character in individuals who have either experienced ague at some anterior period, or who live in an atmosphere tainted, even slightly, with effluvia from vegetable decomposition as, for instance, along the banks of the Thames, between London and Richmond, a district in which the malaria is so much diluted as rarely to produce overt ague. Inflammations of the brain are subject to the same intermittent character, innumerable instances of which have been recorded by various authors. Thus, in one case by Parent and Martinet, five paroxysms with delirium and coma occurred on consecutive evenings, and the last proved fatal: in a second case, four paroxysms occurred at the same hour daily: in a third, five paroxysms occurred at the same hour on alternate days, the apyrexia being complete in the intervals. After death all presented inflammatory injection of the membranes, with purulent effusion, or softening or abscess, of the cerebral substance. These cases were mistaken for pernicious intermittent fevers, and were treated merely with quinine. We do not see the difficulty which some have experienced in explaining such cases. It is known that inflammation of the brain sometimes steals on so slowly and insidiously, especially in aged persons and in weakly constitutions, as to produce comparatively slight symptoms, though serious disease be in progress. Supposing intermittent fever to be superadded to such a case, it is intelligible that the intermissions might be exempt from delirium, coma, and any marked degree of fever; whereas, the supervention of the paroxysm, by congesting the brain in common with all the other internal organs, would furnish an additional source of irritation, sufficient to impart an acute character to the cerebral symptoms, and produce delirium, convulsions, and coma. We have more than once witnessed this train of phenomena in the pernicious intermittent fevers of Rome, complicated with cerebral inflammation; and have seen such cases successfully treated by large doses of quinine every two to four hours, in conjunction with antiphlogistic treatment addressed to the head. The explanation now offered is still more intelligible in reference to chronic inflammation of the brain, and it is principally this which presents the intermittent character. It will hereafter be seen that organic diseases of the brain may also be intermittent, and that an analogous explanation applies to them.

Anatomical characters of cerebritis. The substance of the brain, when sliced, presents an increased degree of scarlet dotting, the dots being larger, more numerous, and of a more vivid red than natural. The French have compared this to a sprinkling with red sand. There is also an increase of red, hair-like streaks, from vessels cut longitudinally or obliquely. These appearances are occasioned by the injection of naturally colourless capillaries. Moreover, there are small, cloudy, red stains, of various forms, sizes, and depths of colour, sometimes as deep as purple or chocolate, which impart a marbled or variegated appearance to the surface of the section. When a number of these smaller stains coalesce, they form large red patches, generally with a soft blending circumference. The stains probably result from rupture, before death, of gorged capillary vessels. The inflamed portion of brain presents, in its earliest stage, a slightly increased degree of firmness, resulting from vascular turgescence; but it is, at the same time, more lacerable than natural. These characters may be scattered in various parts, or they may affect a large continuous extent, even the whole brain; and the grey substance, from its greater vascularity, is more subject to them than the white. Thus, of 41 cases by Lallemand, the grey substance was the principal seat of the inflammation in 33, and the white in 8 only. If extensive, the inflammation may be fatal in this early stage of mere vascular congestion, and that too with comatose symptoms, erroneously ascribed, by old writers, to effusion alone; for tumefaction of the brain from vascular engorgement is no less calculated than effusion to occasion

compression. If the inflammation be limited in extent, it commonly passes on to the next stage, that of—

Softening. Here the increased firmness is replaced by morbid softness to the touch; a pulpiness is next visible to the eye; and, finally, the softened portion is broken up into a disorganised diffuent matter, intermixed with remains of cellular and vascular tissues. The colour of softening mainly depends on the previous quantity of blood in the part. If it was a deep red colour, the blood is never wholly absorbed; but, mixed with pus, is changed from red to chocolate, and then successively to brown, dirty green, and grey. Some have assigned to this the appellation of “red softening.” If the redness was originally slight, the blood is so far absorbed as merely to impart a dirty greenish tinge to the pale yellow colour, which results from purulent infiltration, at first appearing in detached points, and then gradually pervading the whole diseased portion. To this the epithet, “yellow softening,” has been assigned. The red and yellow varieties may, of course, coexist in the vicinity of each other. In the midst of softened portions of brain, extravasations of blood are very apt to take place, in consequence of disorganisation and rupture of considerable vessels. They present a number of reddish-black spots, varying from the size of a pin’s head to that of a pea, or more. It is important that this be distinctly understood, lest such softening be confounded with that which is merely consecutive to apoplectic extravasations, instead of being the cause of them. There is a third variety of softening, which is of a pure blue white, often like curd, or whipped cream, sometimes glistening like satin, and always moistened with serum. This is sometimes a result of inflammation, and sometimes not. Abercrombie has satisfactorily demonstrated it to be a result of inflammation when preceded by inflammatory symptoms, as those of acute hydrocephalus, and when accompanied by other anatomical vestiges of inflammation in its immediate vicinity, as softening, abscess, and effusions of lymph, serum, and pus, into the ventricles. The parts in which he has seen this inflammatory white softening are the corpus callosum, the septum lucidum, the fornix, and the cerebral substance immediately surrounding the ventricles. He ascribes it to gangrene, from suspension of the circulation by the intensity of the inflammation. On the contrary, white softening is not inflammatory when it occurs in aged persons, affected with disease of the arteries at the base of the brain, and presenting the symptoms of “creeping palsy.” This form has been particularly described by Rostan, who, as well as Abercrombie, ascribes it to gangrene from interruption of the circulation by disease of the arteries.

Suppuration and abscess. It has been stated that inflammatory softening is attended with a secretion of pus. This appears first in detached globules, which multiplying, enlarging, and coalescing, eventually form collections or *abscesses*. The number of these may be one or two, or may amount to five, six, or more; but small collections, contiguous to each other, are apt, as the disease advances, to coalesce by extension, and form larger abscesses. Suppuration takes place in the brain as rapidly as in other parenchymatous organs. Laennec states that he has known it to occur within twenty-four hours. In one of Dr. Abercrombie’s cases several small abscesses were found after four days’ illness. Abscesses, when recent, are circumscribed by the cerebral substance alone, which being softened, and more or less broken down, forms an irregular, undefined boundary. The pus within the abscess is sometimes pure and of a yellow or greenish-yellow colour; but in other instances it is mixed with shreds and fragments of disorganised brain, diluted with a thinner fluid, and discoloured by blood, which, in different stages of decomposition, presents various tints of brown, dirty green, and grey. Such are the appearances presented by abscesses if the patient have died within a week or ten days; but if he have survived this period, the abscess gradually becomes lined by a cyst, formed by successive layers of coagulated lymph: the lymph at first appears here and there like cellulo-vascular tissue: a little later it forms a fine soft membrane,

which may with care be detached from the cerebral substance: finally, the membrane presents a distinct organisation, and is so firm as to admit of being detached with considerable facility. Though the first traces of a membrane have been observed at the expiration of a week, three or four generally elapse before it attains the perfect organisation now described. When abscesses are throughout of chronic formation, which is most apt to be the case in scrofulous subjects, or in connection with disease of the bones of the cranium, the cyst is wont to be much thicker, and sometimes to consist of two or more layers, separable from each other. The internal layer we have often observed to present a soft pulpy aspect, not unlike the villosity of a mucous membrane; beneath this is a thicker and firmer layer, like indurated lymph or albumen; and externally is a more lax cellulo-vascular tissue, forming the medium of adhesion to the cerebral substance. The pulp within these chronic abscesses is more commonly of a foul green colour, and sometimes it is exceedingly fetid, more especially in abscesses connected with disease of the ear. The most common seat of abscesses, whether acute or chronic, is within the interior of any part of the hemispheres; but there is no portion of the brain which is exempt from them.

The *cerebellum* is less subject to abscess than the cerebrum, and the *medulla oblongata* still less than either. Abercrombie records the case of a young girl, in whom the left lobe of the *cerebellum* was entirely converted into a bag of purulent matter of a greenish colour and intolerable fetor. The cerebral substance surrounding recent acute abscesses is always found softened; for, in fact, the abscess is the focus of the previous softening: but chronic abscesses often present little or no alteration of the contiguous cerebral substance, and hence we derive an explanation of the well ascertained fact, that such abscesses may, for an indefinite period, be unattended with material symptoms; a time however at length arrives, when, either from the enlargement of the abscess, or from its internal changes, or from some external determining cause, the cerebral substance becomes irritated, inflamed, and softened; in connection with which morbid actions, supervene unequivocal symptoms of chronic cerebritis, or at least of a serious organic affection, which proves speedily fatal. When chronic abscesses, by enlargement or extension, reach the surface of the brain, they sometimes, after implicating, or even penetrating, the membranes, occasion disease of the cranium itself. In this manner the petrous portion of the temporal bone and the internal ear have frequently been disorganised, and the same has occasionally happened to the *æthmoid* bone, the matter of the abscess being not unfrequently evacuated through the ear or the nose. We do not think that abscesses of the brain, like those of external parts, have a tendency to open towards the surface or the ventricles; for the support of the cranium renders the pressure equal in all directions; which is not the case in other parts of the body, where, consequently, abscesses travel in the direction which offers least resistance.

Ulceration. By this is meant an erosion, with depression, of one of its surfaces, the ulcer having a rough, irregular base, covered wholly or in part by soft lymph, sometimes intermixed with blood. The surfaces affected are principally those of the cerebrum, the *cerebellum*, and the ventricles; but the pons, *medulla oblongata*, and spinal cord are not exempt. Vascular injection of the *pia mater*, with thickening, and sometimes with erosion, is always found in the vicinity of superficial ulcers; whence it is more than probable that it is a result of local inflammation of the *pia mater*. Softening of the cerebral substance is occasionally found beneath the base of the ulcer, and is most commonly confined to the grey substance, but sometimes it penetrates more deeply. The extent of ulcers varies from a line to two or three inches or more, but we have generally found them under an inch. Their depth may amount to an inch, but is more commonly limited to two or three lines. They produce the obscure symptoms of chronic cerebritis.

Induration, the converse of softening, is sometimes occasioned by the same cause, namely inflammation. When general, that is, affecting the greater

part or the whole of the brain, the degree of hardness never exceeds that of brain which has been immersed for some time in dilute nitric acid. The induration is not always equal throughout the whole of the parts affected, the central medullary parts usually exhibiting a higher degree of it than the grey substance. A section of the indurated portions generally presents increased vascularity in the usual speckled and striated form; yet the reverse is occasionally observed, the brain being preternaturally white. This general induration is usually ascribed to acute inflammation; yet there is reason to believe, that the inflammation is of a less active kind and of longer duration than that which produces acute softening; for general induration has been observed principally after protracted typhoid fevers, in which inflammation is usually of a low type, and in the insane, who have presented cerebral symptoms of old standing. When induration is partial, which is much more common, it may be as firm as new cheese or even wax, or, if elastic, as fibro-cartilage. The colour may either be red, from increased vascularity, or it may resemble yellow fibrous tissue, or it may be white, from diminished vascularity. Chemical analysis proves that the change is referrible to a great increase of albumen. It may affect any part of the brain, but is more common in the interior than in the convolutions of the surface. Its extent is generally limited to one, two, or three inches. It occasionally proceeds to softening. Partial induration is always the result of inflammation of the chronic form, giving rise to perverted nutrition, the elementary or nutritive particles of the part affected being harder and more albuminous than natural. It has been well pointed out by Abercrombie, that partial induration may be the origin of many organic tumours.

We may here remark incidentally, and merely for the purpose of indicating a general analogy, that the spinal cord is subject to inflammatory lesions, identical in their nature with those of the brain; namely, to inflammation of the membranes, with thickening and the usual effusions of serum, lymph, and pus, and to softening, suppuration, abscess, ulcer, and induration of the medullary substance. These will be more fully considered under *Spinal Diseases*.

Comparative frequency of the several forms of cerebral inflammation. Inflammation of the dura mater, exclusive of that produced by fractures and other surgical affections, is perhaps the most rare variety. The phrenitis of old authors, that is, inflammation of the membranes and surface of the convexity of the brain, with furious delirium and rapid sinking, is not, according to our observation, a frequent affection in this country; but it is much more common in tropical climates, where inflammations in general are characterised by intensity and rapidity of progress. Inflammation of the central parts of the brain, with or without effusion into the ventricles, and not unfrequently conjoined with meningitis at the base or on the hemispheres, occurring principally in children, and running a protracted course of fifteen to thirty days, with two or three well-marked stages, is an affection which, under the designation of hydrocephalus, is perhaps not surpassed in frequency by any other single variety of cerebral inflammation. General acute cerebritis is rare; partial is pretty common, especially with more or less meningitis; chronic partial cerebritis is perhaps equally, or even more, common.

Predisposing causes. 1. Scrofula may be mentioned as a predisposing cause, since it imparts a proclivity to slow inflammation of the brain, in common with many other organs and tissues of the system. It also predisposes indirectly, by favouring the development of various chronic diseases, as inflammatory and other derangements of the stomach, bowels, and liver, worms, otitis, numerous cutaneous eruptions, &c. all of which affections may operate as exciting causes of inflammation of the brain. Hence, it is mainly in delicate, scrofulous children that we witness the slow form of hydrocephalus. 2. Hereditary irritability of the nervous system in general, and therefore, of the brain in particular. This, again, obtains principally in the scrofulous. 3. Early age, because the head and cerebral vessels are proportionably larger

in the youthful periods of life; also, because infants and children are more subject than adults to irritations, from dentition, worms, derangements of the stomach, bowels, liver, &c. The most common age, according to Guersent's observations, is from five to fifteen. The tables of MM. Parent and Martinet, indeed, assign the period between fifteen and sixty as the most common; but a fallacy, which they have overlooked, resides in the circumstance, that their cases were principally collected in an hospital devoted to adults. Thus, out of 180 cases by these authors and Lallemand, 139, that is, nearly $\frac{3}{4}$ ths, were above the age of fourteen! The fallacy is self-evident from these numbers alone, as the personal experience of every practitioner will satisfy him, that the proportion of cerebral inflammations in children is far from being so small as is here indicated. 4. Advanced age predisposes to partial cerebritis in the subacute and chronic forms; probably because disease of the arteries of the brain is most prevalent at that period of life. 5. The male sex predisposes in adults: thus, of 116 cases by Parent and Martinet, 88, or more than $\frac{3}{4}$ ths, were male. The cause of this probably resides in the fact, that males are more subject to external injuries of the head, to exertions and fatigue, and to every form of dissipation and excess; circumstances which give rise to inflammation not only directly, but indirectly, by exciting disease of the heart and of the arteries of the brain. 6. Precocious talent in children, subjecting the brain to inordinate and premature excitement. 7. Habits of immoderate intellectual exertion in adults, over-stimulating the brain, and causing active determination or congestion, as formerly explained. 8. Sanguine, ardent, and violent temperaments. 9. Plethora, especially if connected with a large head, short neck, and square frame. 10. Hypertrophy, with or without dilatation of the left ventricle, which acts by violently propelling an inordinate quantity of blood into the cerebral arteries. 11. Obstructions in the heart from valvular disease, dilatation, and softening, sometimes, though rarely, produce inflammation, but by a converse mode of operation, namely, by impeding the return of the venous blood from the brain.

Exciting causes. Inflammation of the brain is very rarely a result of the ordinary exciting causes of inflammation in general, namely, cold following heat or perspiration and fatigue. In the immense majority of cases it is a secondary or symptomatic affection, as will be perceived from the following numerous list of exciting causes, which cannot be too attentively studied by the young practitioner:—

1. Febrile diseases are by far the most frequent causes, especially continued fever, scarlatina, variola, pertussis, rubeola, erysipelas of the head, and other cutaneous diseases of that part. Thus, according to Dr. Crawford (*Cyc. of Pr. Med.* vol. i. p. 309.), of 864 cases of continued fever, in a fever hospital, 602, that is nearly $\frac{3}{4}$ ths, exhibited cerebral symptoms. In scarlatina, inflammation of the brain is apt to come on, frequently in connection with inflammatory anasarca, between the tenth and twentieth days after the disappearance of the eruption. The convulsive and comatose symptoms were formerly mistaken for the consequences of mere dropsy affecting the brain, in common with the rest of the body. It is now however fully ascertained that the affection is inflammatory, and the patient only to be rescued by prompt and vigorous antiphlogistic treatment, with the use of mercury. So rapid are many of the cases connected with this and other cutaneous eruptions, that Gölis has designated them by the epithet *water-stroke* (wasserschlag), serous effusion, generally turbid from lymph or pus, being commonly found in the ventricles after death. In measles, meningitis and bronchitis are almost the only sources of immediate danger. The inflammation appears to be propagated from the nasal mucous membrane to the interior of the head. In erysipelas of the head it is propagated by contiguity, and not, as was formerly supposed, by metastasis, that is, a desertion of the external part, and a concentration on the internal organ; for the inflammation does not necessarily, or even generally, desert the exterior. We suspect, however, that when the external vessels are constricted by cold

applications, a vicarious determination is apt to take place to the internal; for we have rarely known cerebral inflammation to occur in erysipelas of the head treated with warm fomentations, but we have repeatedly noticed the reverse. In pertussis, the engorgement of the head by the paroxysms of cough, appears to be the determining cause of the cerebral irritation and inflammation. We have known slight convulsions follow every paroxysm. Gout and acute rheumatism are reputed, but, according to our personal observations, unfrequent, causes of inflammation of the brain. Scarcely less rare are parotitis, nephritis, and testitis.

2. External injuries of the head, as blows, concussions, wounds, &c. are much more frequent causes of cerebral inflammation than is generally supposed. This is especially the case with young children, in whom the fall or blow is overlooked or forgotten, because two, three, or more weeks may elapse before formidable symptoms make their appearance. Though the patient have recovered from the immediate effects of an injury, it often leaves the brain in an irritable state, and predisposed to inflammation on the application of an exciting cause, however slight. Thus, some are unable for months, or even years, to take wine, spirits, fermented liquors, or even animal food, with impunity. A glass of spirits has often been known to produce delirium, and we once saw intoxication occasioned by a basin of broth, after farinaceous diet had been employed for several weeks. Under the denomination of external lesions, we may range deep-seated inflammation of the ear, the nose, and the eye; also syphilitic and other diseases of the cranium, subjects on which we have already descanted as exciting causes of inflammation of the *dura mater* especially. We once saw fatal meningitis (phrenitis) follow the extraction of a tooth while the gum was inflamed. The accidental ligation of considerable nerves about the neck in surgical operations for aneurism, &c. has been known to produce the same effect.

3. Powerful and frequent exciting causes of cerebral inflammation, especially in children, are to be found in various complaints which seem to act by propagating to the brain an irritation from the sentient extremities of the nerves of the part affected: for instance, irritation and inflammation of the gums during dentition; the irritative or inflammatory diarrhœa accompanying dentition; the same, in infants and children, independent of dentition, and often called infantile remittent fever; *tabes mesenterica*, *marasmus*, &c.; worms in all their varieties; disease of the liver, and pneumonia in children. Phthisis is added by authors to this class, but we think it rare, as we have never witnessed an instance: perhaps the cerebral inflammation is only a result of the same scrofulous constitution which had generated the pulmonary tubercles.

4. Suppressed natural evacuations and morbid discharges constitute another class of exciting causes. Amenorrhœa and constipation are the most common: the effect of constipation, for instance, in occasioning headach, is notorious. Ischuria renalis, though unfrequent, is one of the most formidable suppressions, as coma may supervene in about three days, and prove fatal in a few days more. The ventricles are usually found distended with fluid. Bleeding hæmorrhoids abruptly checked in plethoric persons, without the substitution of some suitable vicarious evacuations: extensive chronic ulcers hastily healed under similar circumstances; and chronic cutaneous eruptions, especially about the head, as *crusta lactea* in children, when prematurely repelled by external applications, are also exciting causes appertaining to the present class. The whole act by exciting vascular plethora of the system in general, and sometimes of the head alone, when that organ happens to be unusually predisposed. The *modus operandi* is strikingly illustrated by the experiment of injecting water into the veins of animals, when delirium and coma are produced, unless the animal have been previously bled.

5. The following exciting causes are direct irritants of the brain: — Habitual intoxication: intense and protracted study; habitual straining of the eye, as by microscopic or telescopic pursuits, and vivid lights; straining of the ear by loud sounds; all the more violent passions of the mind, as rage, grief,

anxiety, jealousy, love, hatred; stooping professions, which congest the cerebral vessels — a cause which we have noticed especially in gardeners, floor-cloth makers, farriers who shoe horses, where the stooping is accompanied by much corporeal exertion. Habitual and violent nervous or bilious headaches, or *tic douloureux*, occasionally become inflammatory; exposure to the direct rays of a hot sun, called *insolation*, *coup-de-soleil*, &c. which mostly occasions *meningitis*, but sometimes *mania*, and sometimes *apoplexy*, if corporeal exertion attend the exposure. Long endurance of intense cold may also excite *meningitis*, sometimes with most furious delirium, of which many striking instances occurred in the disastrous Russian campaign of Buonaparte. Opium, the effects of which in exciting headach, and even delirium in some constitutions, are familiarly known; but it is comparatively little known, though it ought to be notorious, that the most minute doses, often administered secretly by impatient nurses to pacify irritable infants, may be productive of fatal consequences. Hyoscyamus and belladonna given in excess, particularly, as Gölis remarks, for the cure of *pertussis*; stramonium, strychnia, which we have several times known to produce the most alarming convulsions and coma; apoplectic extravasations, which, by irritating the surrounding cerebral substance, excite inflammation and softening; tumours and other organic diseases of the brain, which may act in a similar manner.

Diagnosis. We shall first recapitulate the pathognomonic symptoms of inflammation of the brain in general, adding the explanations of them so far as appears to us possible in the present state of science; for we feel confident that a thorough knowledge of these symptoms is one of the most important elements in the diagnosis; since it keeps the practitioner's attention alive to the very first indications of cerebral inflammation, often overlooked from inadvertence, and thus leads him to institute a searching and jealous inquiry into all the circumstances of the case. We shall, secondly, point out the diagnosis of the several varieties of cerebral inflammation from the diseases with which they may be respectively confounded.

I. As the symptoms of inflammation of the brain in general are numerous, and difficult to register in the memory, we shall endeavour to simplify them by adopting, with Abercrombie, an arrangement according to their seats.

In the head. Violent headach, with throbbing and giddiness, especially if the pain be referred to a particular spot and always to the same part; sense of weight and fulness, or of tension and constriction, tinnitus, stupor, a great propensity to sleep. In many obscure and insidious cases, a constant feeling of giddiness is the only remarkable symptom. The headach, tension, and throbbing, are referrible to vascular fulness; and the giddiness, drowsiness, and stupor, to compression of the brain by vascular turgescence or by effusion. It is not generally known, but we think it a demonstrable fact, that the brain is actually swollen from vascular turgescence during inflammation. This may occasion every degree of coma and paralysis from pressure, even in the first stage, the pressure in one part probably occasioning an obstruction to the circulation in another: in the later stages, the pressure may result either from this cause or from effusion in various parts; or the symptoms may result from disorganisation.

In the eye. Intolerance of light; unusual contraction or dilatation of the pupil; squinting; distortion of the eyes outwards; paralysis of the muscles of the eyelids, producing, according to the muscle that is affected, either the shut eye (*ptosis*), or the gaping eye (*lagophthalmia*); transient or permanent blindness, or double vision; objects seen that do not exist; a long-sighted person suddenly recovering ordinary vision.

The impatience of light is from augmented sensibility; the remaining symptoms are principally from various degrees of compression in various situations. It is not, perhaps, positively determined, why the pupil is sometimes contracted and sometimes dilated; and why, in many cases, these conditions rapidly alternate. Contraction, however, in the early stages of inflammation

of the brain, appears to depend on irritation of the optic nerve; and dilatation, in the later stages, on its compression, while oscillation between the two probably depends on a fluctuating action of the nerves and muscles of the iris. Strabismus or squinting depends on compression, occasioning more or less paralysis of the third or oculi-motor nerve; and it presents different varieties, according to the number and situation of the branches implicated. Thus, when the eye is distorted inwards, the tonic action of the internal rectus or adductor muscle of the eyeball prevails over that of the opponent muscles, which are paralysed. When the eye is distorted outwards, the abductor muscle supplied by the sixth nerve is unaffected, whilst the adductor, supplied by the third, is paralysed. The tonic action of the superior oblique, co-operating with that of the abductor, turns the eye upwards and outwards. Rolling of the eye is from *clonic* or intermittent action of the several muscles. Compression of the third nerve is also the cause of the closed eye or *ptosis*, the levator palpebræ muscle, supplied by this nerve, being paralysed. The open eye is occasioned by complete paralysis of the seventh nerve, the excito-motory branch of which supplies the orbicularis oculi, which is the sphincter muscle of the eye. This muscle is not paralysed in hemiplegia from pressure restricted to the opposite hemisphere; as, for instance, that occasioned by a small extravasation; because the excito-motory branch (which springs from the grey matter of the medulla oblongata) is not compressed; but if the extravasation be near the medulla oblongata, so as to compress it; or if it, or any other cause of pressure in one hemisphere, be so considerable as to compress the whole brain, the excito-motory branch may participate in the effect, and the orbicularis oculi may be more or less paralysed. The common cause, however, of its paralysis, is compression of the seventh nerve in its course either within or without the cranium; as, for instance, by an internal tumour, by swelling of the parotid gland, &c. The open eye, therefore, is independent of cerebral disease in some cases, and dependent on it in others; whereas the closed eye and strabismus are almost always cerebral affections. Blindness (amaurosis), transient or permanent, results from compression of the optic nerve by pressure, general or local, within the cranium.

In the ear. Unusual acuteness of hearing, with intolerance of sound; great noise in the ears (tinnitus); transient attacks of deafness. The acuteness and intolerance proceed from exalted sensibility, and the deafness from compression of the eighth or auditory nerve. The tinnitus may exist in connection with either cause.

In the speech. Indistinct or difficult articulation; unusual quickness or unusual slowness of speech. Difficult or slow articulation proceeds from compression of the portio minor of the fifth, distributed to the temporal, masseter, buccinator, and pterygoid muscles; the portio dura of the seventh, distributed to the external voluntary muscles of the face; and the lingualis, a voluntary muscle of the tongue. Unusually quick articulation (which we have also observed to be generally hesitating) results from cerebral excitement. We have also noticed quick movements and much winking of the eye to be concomitant and very characteristic phenomena.

In the pulse. Slowness; remarkable variations in frequency, occurring repeatedly even in the course of a minute. The slowness proceeds from compression, whether that of cerebral tumefaction or of effusion, its effect being, as in apoplexy, to retard the action of the heart. The variability is probably from an irregular transmission of nervous power. Slowness is a deceptive phenomenon, as it disguises fever; yet, in connection with other cerebral symptoms, it is highly characteristic and suspicious, and it can scarcely be mistaken if accompanied by variability.

In the mind. High delirium; transient fits of incoherence; peculiar confusion of thought; and forgetfulness on particular topics. These proceed from disturbance of the intellectual functions of the brain, *i. e.* memory, attention, judgment, &c. High delirium is generally connected with inflammation of the

membranes on the surface of the hemisphere, and with its acute stage. Some explain this by maintaining that the grey matter of the convolutions is the source of mental power, as the grey matter of spinal cord is of motive power. Hence, in disease of the base and centres of the brain, convulsive and paralytic affections usually precede disturbance of the intellectual functions.

In the muscles. Paralytic and convulsive affections, sometimes confined to one limb, or even to part of a limb; a state of rigid contraction of particular limbs. Paralysis, when universal, proceeds from general compression, with obstructed circulation, within the cranium, occasioned either by cerebral vascular tumefaction, or by effusion, or both. We see the same in apoplexy, either from extreme extravasation into the substance or ventricles of the brain, or from widely diffused extravasation from the vessels of the pia mater on the surface of the hemispheres. Convulsions, according to writers on the *true spinal or excito-motory* system of nerves, proceed from irritation of this system. When occurring in meningitis of the hemispheres, and before compression may be supposed to have taken place, they are ascribed to irritation transmitted through the nerves distributed to the membranes, as Arnold's recurrent of the fifth. When occurring in meningitis, with copious effusion on the surface; in meningitis of the base or ventricles; or in cerebritis, they are ascribed to pressure irritating the medulla oblongata, corpora striata, &c. which constitute the superior extremity of the *true spinal* column or grey matter of the cord. Dr. M. Hall states, in substantiation of this view, that in a girl, æt. 13. croup-like convulsions occurred repeatedly, until one day, when the bones of the cranium separated, which put a final period to them. In another case, croup-like convulsions occurred whenever the child, affected with spina-bifida, was turned so as to press upon the tumour. In the case of an acephalous fœtus, described by Mr. Lawrence, convulsion was produced by pressing on the medulla oblongata. In a case of meningitis given by Dr. Abercrombie, convulsion was induced by pressure on the anterior fontanelle, which became very prominent. Hypertrophy of the brain induces convulsions, unless the cranium grow with the brain. Rigid contraction of limbs is referred to the same source; for *all spasm*, whether clonic as in convulsion, or tonic as in rigid contraction, is assumed to depend on the excito-motory system. When either paralysis or spasm is partial, it is connected with partial disease, or, in other words, with less extensive pressure and irritation within the cranium. We have frequently seen spasm of one side of the body, or of individual muscles, with paralysis of the opposite side, or of other individual muscles; but the co-existence of spasm and complete paralysis in the same muscles is impossible, because the excito-motory nerves cannot excite paralysed muscles. Dr. Hall explains the following practical remark of Lallemand on excito-motory principles:—"In inflammation of the arachnoid," says Lallemand "there are *spasmodic* symptoms without paralysis;" i. e. says Dr. Hall, from irritation without paralysing compression; "in hæmorrhagia, sudden *paralysis* without spasmodic symptoms;" i. e. from paralysing compression rendering spasm impossible; "in inflammation of the substance of the brain, *spasmodic* symptoms, and *slow and progressive paralysis*;" i. e. from irritation at first, gradually superseded by paralysing compression or disorganisation.

In the organs of touch. Diminution or loss of sensibility in a limb, or often in a very small part of a limb, and various morbid conditions of sensation. These phenomena proceed from more or less extensive and complete paralysis of nerves of sensation, and are connected with the same causes as paralysis of the nerves of voluntary motion.

Such are the symptoms indicating disturbance of the cerebral functions. The student must not however expect all, or even many, to be simultaneously present; but the existence of one or two should be sufficient to awaken his suspicions. It has been well remarked by Abercrombie, that in this important diagnosis minute attention to the correspondence of the symptoms is of more importance than any particular symptom: thus, the peculiar oppression which

accompanies a high degree of fever is familiar to every one, and is not reckoned an unfavourable symptom; the same degree of oppression occurring without fever, or with very slight fever, would indicate a cerebral affection of the most dangerous character. In the same manner, a degree of headach and delirium, which, accompanying a high degree of fever, would be considered as symptomatic; accompanying slight fever, would indicate a dangerous affection of the brain.

We now proceed to point out the diagnosis between the several varieties of inflammation of the brain and the diseases with which they may respectively be confounded. These diseases are, *mania, continued fever, delirium tremens, apoplexy, active determination and congestion of the brain in various diseases of infancy, exhaustion, and hysterical, neuralgic, rheumatic, bilious, and dyspeptic headaches.*

Meningitis of the convexity of the hemispheres, with fierce delirium (phrenitis), is distinguished from mania by the more or less complete absence of fever and disturbance of the digestive organs, together with the prolonged course, which characterise mania.

The diagnosis of meningitis, both superficial and central, from continued fever with cerebral disturbances (*typhus mitior; fièvre nerveuse, ou ataxique essentielle*), is certainly very obscure. The symptoms of cerebral excitement sometimes commence as early in the fever as in meningitis, but more commonly they are later, not appearing till after the lapse of two or three days or more. The nature of the symptoms may, at the onset, be much the same in both; but the progress of the two affections soon renders manifest a remarkable difference between them. The typhus fever is characterised by restlessness in a high degree, by anxiety, low delirium, and spasm, in the form of subsultus tendinum, but seldom more; and these symptoms often alternate with intervals of calmness and even of sleep, especially in the morning. In meningitis, on the contrary, there is comparatively little restlessness, except in the phrenitic variety, when there is wild delirium, but not the peculiar restlessness of fever; the muscular symptoms are distinct convulsions, spasmodic rigidity, or paralysis; they occur in connection with a state either of delirium, decided somnolency, or complete coma; and these symptoms are more or less permanent, seldom exhibiting intermissions, except occasionally in the earliest stage. The pulse in fever does not fall below its natural standard, display singular fluctuations in frequency, and finally rise to an extreme degree of acceleration before the fatal event — circumstances which are highly characteristic of meningitis; nor is the respiration suspicious and irregular in fever, as in meningitis.

Finally, in the later stages of fever there are, a parched, brown, crusted tongue, with sordes on the teeth; dark, offensive faecal evacuations; tympanitic abdomen; sometimes petechiæ; low muttering delirium; the supine posture; slipping down in bed; symptoms which, taken in connection with the absence of the pathognomonic symptoms of meningitis, render the diagnosis so distinct, that the two diseases can scarcely be confounded.

We have seen cases of general cerebritis present symptoms at the onset very like those of low fever; but these may be detected with little difficulty by observing that the headach is more intense and permanent than corresponds with the degree of fever, and that it usually increases in intensity as the pulse falls — a most suspicious circumstance, especially if the pulse also fluctuate and the respiration be suspicious and irregular. Such are the most prominent diagnostic criteria between inflammation of the brain and fever.

Delirium tremens is distinguished by the absence of the headach; by the peculiar tremors; by the singular hallucinations and spectral illusions, inspiring fear in the patient; by the remarkable wakefulness; by the tractability and unoffensiveness of the delirium; by the copious clammy perspirations; and by the history being that of habitual inebriation: on the contrary, there is absence

of the somnolency, coma, convulsive and paralytic affections, and slowness of the pulse, which characterise inflammation of the brain.

Apoplexy is distinguished by its invasion being abrupt, the paralysis sudden and complete, and the course of the disease short and rapid; whereas, in partial cerebritis, there are most frequently premonitory symptoms; tonic or clonic spasms generally precede the paralysis, which supervenes more gradually, and the course of the disease is irregular and comparatively slow. It must not, however, be forgotten that, when cerebritis is excited by an apoplectic extravasation, spasmodic symptoms, with delirium and fever, may follow the apoplectic phenomena.

Active determination and congestion of the brain in various diseases of infancy, has already been elaborately noticed. In infants under a year old, the diagnosis requires the most scrutinising attention. "The head hanging over the nurse's shoulders, and the half-closed eyelids," says Cheyne, "are alarming symptoms; and in no other complaint do we observe the same knitting of the eyebrows unaccompanied with crying." There is a quiet, vacant, abstracted air in the face, from non-convergence of the pupils, very different from the lively, violent, and varying expression, indicative of acute pain from other causes than cerebral disease. There are no paroxysms of temper, with alternate extension and retraction of the legs, as in colic and gripes. If, in addition to these symptoms, there be unusual wakefulness, or unsound sleep with starting and crying, or obstinate screaming without obvious cause; if, while awake, the infant seem drowsy, moan, roll its head restlessly on the pillow or the nurse's arm, or keep thrusting it backwards against the pillow; if there be a shrinking and frowning aversion to light, a contracted or dilated state of the pupil, or disobedience of it to light, and obstinately frequent vomiting not explicable by other causes, we may feel almost certain, in the absence of great and rapid exhausting causes capable of producing some of the same symptoms (the *hydrencephaloid* disease), that we are dealing with the first stage of inflammation. If coma, dilated pupil, blindness, and strabismus, with or even without convulsions or spasms, have taken place, the nature of the case can scarcely be doubted, and the disease has made considerable advances.

The same diagnostic symptoms are applicable to children above the age of one year, and they are rendered more distinct by the declarations or more intelligible manifestations of the patient with respect to pain, fever, and other circumstances.

The most perplexing cases are those in which the cerebral symptoms are unusually masked by great previous exhaustion and emaciation from tubercular disease, dentition, and chronic gastro-enteritis (infantile remittent fever, *tabes mesenterica*, *marasmus*). After scarlatina, likewise, the utmost attention is requisite for two or three weeks to detect the very first symptom of inflammation of the brain, which, as already stated, generally supervenes in connection with inflammatory anasarca. The occurrence of severe headach should be regarded with the utmost suspicion, as usually being the earliest sign. If neglected, convulsions, coma, and other formidable symptoms rapidly follow.

Worms are distinguished by the transitory nature of the headach, vertigo, dilatation of the pupils, convulsions, and vomiting, which they occasionally excite; by the absence of fever, of the slow fluctuating pulse, of the unequal suppurious respiration; and by the symptoms not presenting the progressive increase and regular course usually observed in inflammation of the brain.

Exhaustion, producing some cerebral phenomena resembling those of *hydrencephalus*, whence it has been called the *hydrencephaloid* disease, is distinguishable by coldness and paleness of the surface, in connection with a very quick and feeble pulse, and by the occurrence of these symptoms after the operation of exhausting causes. This important subject will be fully considered in an article appended to the present.

The diagnosis of nervous, hysterical, neuralgic, rheumatic, and bilious and

dyspeptic headach is so simple, as merely to require in the student a competent knowledge of these several affections. (See CEPHALALGIA.)

Prognosis. Meningitis of the convexity of the hemispheres, though extremely rapid and dangerous if neglected, is perhaps the most tractable form if promptly and vigorously treated. Internal arachno-cerebritis (hydrocephalus) is less tractable and more fatal. Before it was known to be an inflammatory disease, the sufferers died, almost without exception; subsequently, the mortality has amounted to about two-thirds; but, in consequence of improvements in diagnosis and the use of mercury, the proportion is now undergoing a considerable diminution. Cerebritis is the most dangerous form of cerebral inflammation, in consequence of the facility with which the organ passes into softening and disorganisation. When chronic, and attended with progressively increasing palsy, complete recovery is exceedingly rare. Success, however, in the treatment of chronic cerebritis is daily on the increase, in consequence of its inflammatory nature being better understood; for formerly, under the supposition that the symptoms were nervous, neuralgic, rheumatic, dyspeptic, or from debility, they were treated with tonics, stimulants, and full diet. The general prognosis is more unfavourable, when inflammation of the brain appears during, or shortly after, other serious diseases, especially typhoid fever, the febrile exanthemata, pneumonia, apoplexy, epilepsy, and mania; because, in these maladies, the vital powers are already more or less exhausted, and in some the blood is diseased, whence active treatment is less easily borne. The same remarks apply to weakly, scrofulous constitutions, especially where several of the family have been affected by hydrocephalus.

The particular prognosis in individual cases is regulated by the symptoms. The following are favourable:—return of natural sleep in contradistinction to somnolent stupor; return of the several secretions; viz. moisture of the tongue, with cleaning of its points and edges, and removal of dry sordes from the gums and lips; gentle perspiration, or at least softness and coolness of the skin; a free secretion of natural urine, and an open manageable state of the bowels; a simultaneous diminution of the heat of the head; a more equal and regular state of the pulse and respiration; and a corresponding amelioration of the other bad symptoms. The earlier this improvement takes place, the more favourable the prognosis; because, in the first stage, or the early part of the second, the disease may not have proceeded beyond vascular turgescence, which, by pressure and interruption of the circulation, is capable of producing the worst symptoms—convulsions, coma, paralysis, &c.; yet, as the brain is not disorganised, the vascular congestion is susceptible of removal. An amelioration in the advanced part of the second stage, or later, ought to inspire less sanguine hopes, as effusions of serum, lymph, and pus, may have taken place, and may not admit of absorption; or, if the case be cerebritis, the effect may have been softening—a highly intractable affection.

The unfavourable symptoms are, a continuance, notwithstanding suitable treatment, of headach, heat, delirium, and watchfulness; or of coma, convulsions, strabismus, spasmodic rigidity, palsy, and a slow irregular pulse: finally, the mortal symptoms; namely, an exceedingly rapid and feeble pulse; relaxation of all the sphincters, including the orbicularis oculi; singultus, aphonia, dysphagia, general muscular relaxation, with inability to move; collapsed cadaverous countenance, &c. Of chronic inflammation of the brain, or acute becoming chronic, the prognosis is always doubtful, and the friends should be apprised that the disease may induce epilepsy, paralysis, mania, insania, or idiocy.

Treatment of Acute Inflammation of the Brain. The success of remedies for inflammation of the brain, however well selected, depends mainly on their being adopted at an early period, and with the utmost vigour that the circumstances authorise. The first twelve hours of an acute case are incomparably more valuable to the practitioner than a much longer period in a subsequent stage. The patient, especially if a child, should, during the early stage, be visited at least every two or three hours, as success is surprisingly

dependent on close watching. The remedies are, blood-letting general and local, active purgatives, cold applications on the head, mercury, and blisters. On these we place our reliance: others are merely subsidiary; namely, salines, diaphoretics, refrigerants, tartar emetic, digitalis, colchicum.

Bleeding. Venesection should be performed while the patient either stands or sits erect; the blood should flow in a full stream, and should not be checked till manifestations of approaching syncope are exhibited. In the more acute cases affecting healthy adults, from twenty to forty ounces or upwards will often be borne before syncope is induced, as this inflammation imparts to the system great tolerance of blood-letting. On the first symptoms of reaction, namely, fulness of the pulse with heat and anxiety, the depletion should be repeated to the verge of syncope a second, or even a third, time, within twelve hours, so as, if possible, to keep down and crush the complaint by preventing the full establishment of reaction. Dr. Maxwell of Dumfries has carried blood-letting in hydrocephalus to a greater extent than any other individual, with the extraordinary success of curing sixty out of ninety cases! He placed the child in the horizontal posture, opened the jugular vein, closed it from time to time with the finger, so as to obviate syncope, and continued the depletion till the pulse became wholly imperceptible. Insensibility followed, and sometimes persisted for several hours. The shock thus given to the circulation is said to have often immediately suspended the disease. Great, however, as was the success of this practice, it is not justifiable; for it is now well ascertained that blood-letting cannot safely be carried beyond the point at which syncope would occur in the erect posture; that in the horizontal posture it is liable to be carried much farther; that coma, convulsions, and even sudden death, may occur during the operation; or, if the patient escape the immediate effects, that he may fall into a state of dangerous exhaustion and anæmic debility.

After one, two, or three general bleedings, as above described, cupping or leeching, at suitably short intervals, will generally prove sufficient to control minor degrees of reaction. After a series of observations, we have not found arteriotomy attended with advantage, but the reverse; as the subsequent bandaging is injurious by heating the head. Opening the jugular vein is applicable to young children, in whom the veins of the arm are so small and indistinct as to render venesection difficult, if not impracticable. In infants, general bleeding is effected by leeching the hand or foot, the celerity of the discharge being promoted by immersion of the extremity in warm water. Paleness of the face is, in them, the indication of faintness, and marks the period when the depletion ought to be suspended.

The quantity of blood to be drawn cannot be specified, but must be regulated by the effect, taken in connection with the constitution, age, and sex, of the individual. It may, however, be stated in general terms, that, in the more active and acute cases, occurring in good constitutions, blood-letting, so long as it is indicated by a recurrence of reaction, may be carried to the utmost limits of the patient's strength; whereas, in slower and less active cases, occurring in feeble or scrofulous constitutions, in the aged, and in the course of, or after, other exhausting diseases, blood-letting can neither be borne to the same extent, nor does it produce the same good effects. In a large proportion of such cases—for instance, in the slow form of hydrocephalus—cupping and leeching will often produce all the good effects which can be derived from this mode of depletion. They may be practised behind the ears, on the occiput, the nape of the neck, or between the shoulders. In France and Germany, we have seen the arms, the groins, and the feet preferred, where the cerebral inflammation was connected with a suppressed hæmorrhoidal or catamenial discharge; but it has appeared to us that, though this mode of procedure is eminently useful for precursory symptoms, direct depletion from the head is more certain and efficacious in actual inflammation. The same objection does not apply to leeching the inside of the nostrils, when the patient has been subject to epistaxis—a favourite

practice with many German physicians. We may finally remark, that though we advise blood-letting to be carried to the utmost limits of the patient's strength in cases where it is indicated, yet the indications will generally cease at so early a period, when mercury is vigorously employed, that the total amount of blood abstracted will commonly be moderate.

Cold applications on the head should be employed immediately, the patient lying with the head and shoulders well raised, and the hair having previously been cut close or shaved. Evaporating lotions alone are totally inadequate to the object. The most powerful of all methods is the cold dash, that is, a stream of cold water, as large as a quill, poured from an elevation of two or three feet on the head of the patient, a basin being held under the chin, and napkins around to prevent splashing. It may be continued for five or ten minutes, or till the patient complain of its being intolerable. It cannot be safely used during decided coma with a feeble pulse, since its sedative influence might overwhelm the powers of life. For the same reasons, it must be employed with caution in delicate children and in aged persons. This remedy is eminently suitable for making a decided impression in the first instance: subsequently, if ice is not to be obtained, it may be repeated every two or three hours, or oftener, during the early stages, whilst there is heat of head and a good pulse. Evaporating lotions on a single fold of linen should be employed during the intervals, in order to maintain the effect and obviate the violent reaction which the sudden and brief application of intense cold naturally tends to produce. The efficacy of the cold dash may be increased by immersion of the feet in warm water, or, what is more convenient, by enveloping them in a blanket wrung out of hot water. The water in either case may be rendered stimulant by mustard powder. The cold dash, however, from being inconvenient and fatiguing to the patient, will seldom be used beyond a few times when ice can be procured. This should be pounded, inclosed in a bladder without air, and applied on the head like a cap. Its situation should be changed every minute or two, both to cool every part of the head, and to prevent the injurious effects which might result from a too protracted application on one spot. By this mode of procedure its use may be continued for half an hour or more at a time, when, if the whole head feel cool, evaporating lotions may be substituted until a return of heat and flushing demands the re-application of the ice. This agent must be used with the same reserve as the cold dash in feeble constitutions, in the aged, in coma with a feeble pulse, and in the advanced stages of the disease.

Purgatives. Except when there is a gastro-enteritic complication, active purging during the early stages possesses great efficacy in almost every form of the acute disease, whether the constitution be robust or feeble. It frequently happens that bleeding fails to produce its full effects till a free action of the bowels is established. After the first bleeding, it is well to administer at once a strong purgative enema, and simultaneously to give a full dose by the mouth. The purgatives usually selected are calomel, either alone or in combination with compound extr. of colocynth, jalap, rhubarb, or scammony; but croton oil is also highly convenient from its certainty, and from the ease with which it may be administered to children, even when the stomach rejects all ingesta. As a first dose for an adult we should prefer either gr. x or xv of calomel alone, or half that quantity with an equal weight of Extr. Coloc. C. expediting its action by a black draught without tincture, administered after an interval of two hours. From three to five motions daily should afterwards be obtained by purgative pills at night and a draught in the morning, in case the practitioner entertain a prejudice against the constitutional use of mercury.

Mercury. We are personally convinced, by careful and unbiassed observation, of the great power and perfect suitability of this remedy in inflammation of the brain, in common with dangerous inflammations of vital organs in general. Some postpone its use till after the acute stage, under the supposition that it stimulates. Our experience has satisfied us, that danger from this source is

imaginary, and that the best effects of the remedy are sacrificed when its employment is delayed, since it is principally by controlling and modifying vascular action in the earliest stage, that subsequent effusions and disorganisation are prevented. We therefore give it at the very onset of the disease, after the first bleeding and administration of a calomel purgative to clear out the alimentary canal. If, however, the practitioner be called in at an advanced period of the disease, when effusions may have taken place, this is not a reason why he should not still resort to the remedy, since effusions may sometimes be absorbed under its instrumentality, when all other remedies would be unavailing. The quantity of calomel at the onset of acute and rapid cases should be equivalent to a grain per hour, exclusive of the first large dose administered as a purgative; and it will be less apt to irritate the mucous membrane if two grains be given every two hours, than if four or five grains be administered every four or five hours. In slower cases, and in young children, half or even one third of the quantity may prove sufficient. The object in every case is to affect the gums, or in other words the constitution, as promptly as possible. It must be recollected that there is great difficulty in rendering the action of mercury manifest in the gums of very young children; yet it does not follow that the constitution is not affected, the contrary being proved by the disease in many instances giving way. It is our habit in all cases to superadd inunction to the use of calomel, in order to obtain the effects of the remedy at a less risk of irritating the bowels than by its internal administration alone. We have never found inconvenient salivation result from friction of so much as an ounce of Ung. Hydr. Fort. into the thighs and axillæ of adults, daily, for two or even three consecutive days: in children, half the quantity may suffice. If calomel should irritate even slightly, of which we may judge by its griping, producing mucous stools, and occasioning calls more frequently than three or four times a day, the quantity may be diminished, and each dose given with $\frac{3}{4}$ ss of Mist. Cretæ and gr. $\frac{1}{2}$ to j of Extr. Hyosc., opium being objectionable from its tendency to stimulate the head. If, however, the irritation be at all considerable, the calomel should be at once commuted for Hydr. cum Cretâ, in doses of at least gr. iij for every j of calomel, with the addition of Mist. Cretæ and Extr. Hyosc. as above directed. If, notwithstanding, the irritation should persist, we must trust to inunction alone, in an increased degree, until the bowels are restored to a calm state by fomentations, poultices, emollient lavements, counter-irritation, liniments, demulcent drinks, &c.; after which, it must be left to the discretion of the practitioner, whether to revert or not to the cautious use of Hydrarg. cum Cretâ. If there be any delicacy of the bowels when the practitioner is first called in, it is better to dispense entirely with the use of calomel, and resort at once to the milder preparations of mercury; namely, blue pill, Hydrarg. cum Cretâ, or Oxydum Hydrarg. Cinereum, conjoined with small doses of Extr. Hyosc. and free external inunction.

During the exhibition of mercury, no succulent vegetables or fruits, and no acid beverages should be allowed; as indulgence in these exposes the patient to an additional chance of gastro-intestinal irritation. By attention to the precautions now inculcated, we have generally succeeded in administering mercury without the injurious effects on the mucous membrane, which constitute, especially with continental practitioners, the principal barrier to its general adoption. Even Gölis, a decided advocate for mercury, is afraid of a larger dose of calomel in hydrocephalus than gr. ss every two hours. Such being the mode of administering mercury, we proceed to notice its effects.

No sooner are the gums sensibly affected than, in the great majority of instances, a distinct amelioration is observed in the symptoms; and, not unfrequently, the amelioration becomes apparent even prior to the affection of the gums. The improvement may occur within the brief space of 48 hours, suspending the indications for further blood-letting, and thus occasioning that economy with respect to this depletion to which we have already alluded. The moment that the improvement has become apparent, the dose of mercury may

be diminished and the intervals extended ; or, if the gums be affected, it may be wholly suspended for a day or two, and resumed again if necessary ; the object being, not to excite profuse salivation, but to maintain a moderate action of the remedy until the dangerous symptoms have wholly subsided. If the body should become confined, in consequence of this diminution or suspension of the mercury, it may be necessary to resort again to the moderate use of ordinary aperients.

Tartar Emetic. This remedy was given in large doses by Laennec with the view of curing inflammation of the brain by its specific effect. Its use, however, on this principle has been almost generally abandoned, even by the French. The objections to large doses are, that they are apt to excite gastro-enteritis, and thus render the internal use of mercury impossible ; also, that they sometimes provoke vomiting, by which act the cerebral congestion is increased, with a general aggravation of the symptoms. We have not, however, found the same objections apply to small doses, as gr. $\frac{1}{2}$ every three or four hours, and we think that, thus employed, tartar emetic is a useful subordinate auxiliary, by promoting diaphoresis and contributing to diminish vascular action. *James's powder*, another preparation of antimony, is also useful in promoting diaphoresis ; and, from its innocuous character, it is very unexceptionable : gr. $\frac{1}{2}$ to $\frac{1}{4}$ may be given with the mercury every two hours.

Digitalis. Without denying the power of this remedy in lowering the pulse, we entertain the strongest objections to its use in inflammation of the brain. In no disease do the symptoms require to be kept, as far as is practicable, in a simple, uncomplicated, and intelligible state ; no remedy is so calculated to confuse them as digitalis. The reduction of the pulse which it occasions cannot be discriminated with any degree of certainty from that occasioned by the supervention of pressure in the second stage ; for we cannot agree with some writers, that in the case of pressure it is distinguishable by a greater sharpness in the beat of the vessel : on the contrary, it is often eminently prolonged and soft, the *oppressed* pulse of authors, any sharpness that it may acquire being merely the result of anæmia from previous depletion. Again, digitalis is apt to produce vertigo, faintness, and nausea ; and how are these symptoms, artificially excited, to be distinguished from the same as results of the cerebral inflammation ? If not distinguishable, we are deprived of the usual checks, and may carry the remedy to a poisonous extent, while we are at a loss how to act with respect to the symptoms themselves, the treatment for digitalis being by stimulants, and therefore widely different from that for inflammation of the brain.

Colchicum is a sedative, allaying pain and vascular action ; but its operation is uncertain, and it is apt, even in doses so small as \mathfrak{m} xx, three times a day, to excite intractable dysenteric inflammation. Considering, therefore, the paramount importance of presenting no impediment to the use of mercury, and taking into account the inadequacy of colchicum to combat so serious an inflammation as that of the brain, we may advantageously dispense with its use.

Diaphoretics and Refrigerants. We have already remarked that, in the present, as well as all other dangerous inflammations, these remedies are, from mere insufficiency, of very secondary value, and should therefore never be allowed to supersede others of more decided and certain efficacy. Tartar emetic in small doses, James's powder, and ipecacuan, are the most suitable diaphoretics ; as they can do little harm and may contribute to do good. The *Liquor Ammonia Acetatis* is a stimulant diaphoretic, usually from containing an excess of ammonia ; we therefore never use it in important inflammations.

Of *Refrigerants*, nitrate of potass, bitartrate of potass, and neutral saline mixture, are those in common use. The vegetable and mineral acids highly diluted, and the acid fruits, are also supposed to be refrigerant ; but we have already stated that they are objectionable, as tending to irritate the bowels and interfere with the use of mercury. Even the saline refrigerants may do the

same, if insufficiently diluted or too freely administered. Cold or iced water is one of the best and least exceptionable refrigerants.

Diuretics are not only objectionable as often nauseating the stomach and leading to polypharmacy, but they are generally superfluous; since, if antiphlogistic treatment with mercury is not sufficient to cause absorption of the small amount of effusion which, in this disease, suffices to destroy life, that happy result will rarely be produced by diuretics. It is principally in other parts, as the pleura, peritoneum, &c. where copious effusion may remain compatibly with life, after the inflammation has been more or less completely subdued, that diuretics are of real value; still, when inflammation of the brain is attended with a deficient secretion of urine, squill and nitre may be advantageously superadded to mercury.

Blisters. There is scarcely any class of cases in which blisters produce happier effects than in inflammation of the brain, provided they be scientifically employed. In the early stages, they are totally unsuitable; since, until blood-letting, purging, mercury, and low diet, have subdued the energy of the phlogistic action, they operate as stimulants, general as well as local, and exasperate, instead of alleviating, the inflammation. In the more advanced stages this danger is no longer to be apprehended, and they are then invaluable. They should be applied of large size, and in quick rapid succession, to the nape, behind the ears, and in severe cases even over the whole occiput as high as the vertex. Some shrink from applying them to the head itself. We feel assured, that provided the pulse has been rendered soft and the head cool by adequate antiphlogistic treatment, the whole occiput may be enveloped in a blister, not only with perfect safety, but often with surprising advantage. We have more than once seen the most profound coma dissipated in twelve hours by this measure. When the vital powers are sinking, blisters and sinapisms applied to the feet, calves, or any other part, are sometimes used as general stimulants to rouse the flagging system.

Whenever a patient labours under delirium or coma, so as to be unable to answer for himself, the bladder should be sedulously examined by hand every morning and night, and the urine drawn off by catheter, if necessary; nor should stillicidium throw the practitioner off his guard, since this is compatible with paralysis of the organ from over-distension.

Silence, gloom, coolness, and perfect repose are pre-eminently important in this inflammation.

Diet. In the first stage, this should consist merely of six or eight ounces of gruel thrice a day, with toast-water at pleasure, or of barley-water alone, taken at pleasure. When the more acute inflammatory symptoms have been subdued, a little panada may be allowed until the approach of convalescence renders a fuller diet admissible. When slow protracted hydrocephalus causes rapidly increasing debility and emaciation, the patient should be supported by a free allowance of beef-tea, mutton-broth, animal jelly, milk, and similar light articles.

Convalescence. The return to an ordinary diet should be made with the most cautious and jealous slowness, since there is no one cause of relapse of so frequent occurrence as premature excesses in diet. For very young children, asses' milk, continued for several weeks, is one of the lightest and most wholesome articles. The transition of the patient to his ordinary habits, particularly those of an intellectual nature, should be equally cautious and slow; since the brain, after inflammation, long continues irritable, and predisposed to a relapse on the application even of the slightest exciting causes. The practitioner, therefore, should continue his attendance on the patient up to a much later period of convalescence than is necessary in most other diseases.

Spurious Symptoms of Inflammation of the Brain. The practitioner would be very incompetent to treat so dangerous a malady as acute inflammation of the brain if he were not thoroughly aware that, at the end of an attack, especially after very active depleting treatment (often unavoidable when mercury is not

used), delirium or coma will sometimes continue, increase, or even come on, from mere exhaustion; and that, if he persisted in the use of evacuating measures, under the erroneous impression that the symptoms resulted from an increase or recurrence of the cerebral inflammation, he would probably kill his patient outright. A small and rapid pulse, paleness and coldness giving an appearance of exhaustion, and the precedence of exhausting agencies, are the distinctive features of this affection. We shall not anticipate a fuller account of exhaustion subjoined to the present article, as a necessary appendage to inflammation of the brain. At present, it will be sufficient to allude to the treatment. Opium, strong broths, and sometimes wine, are the remedies; opium allays the cerebral irritation giving rise to delirium, and sometimes immediately produces calmness and refreshing sleep. It may be given in full doses at suitably long intervals, or in small doses at short intervals, if the practitioner wish cautiously to feel his way. Hyoscyamus will answer the same purpose, but is less certain than opium. It is seldom before exhaustion, or a tendency to it, supervenes, that narcotics are serviceable in inflammation of the brain. Strong beef-tea should be simultaneously given, and it is better borne and more efficacious in small doses, as an ounce or two every half-hour or so, than in full quantities at long intervals. Ammonia and camphor are sometimes requisite as temporary stimulants; but if the pulse be very small and weak, and the exhaustion be evidently great, with a tendency to sinking, wine must be more or less freely given. As much as a wine-glass hourly, for several consecutive hours, has been known to produce the most salutary effects. (*Abercrombie*.) When, under these circumstances, coma continues obstinate, a large blister over the whole occiput will sometimes effectually rouse and restore the patient; of which happy result we have witnessed several instances. In conclusion: if the practitioner be doubtful whether the symptoms be referrible to exhaustion or not, he should commence the above treatment cautiously, watch carefully, and be guided by the result. If the patient improve, he may feel pretty confident that his view is correct, and may prosecute his measures with less reserve. If heat, flushing, and acceleration of pulse be induced, he must desist.

Treatment of Chronic Cerebritis. The same antiphlogistic measures are requisite as for the acute affection, but they should be less vigorously pursued. During the first stage, or that of excitement, characterised by headach, vertigo, convulsions, or rigid spasms, with or without fever, blood-letting, either general or local, should be employed to an extent corresponding with the urgency of the symptoms and the powers of the constitution. Sometimes a single bleeding will suffice; in other cases, two or three repetitions within a day or two are demanded for the reduction of the immediate symptoms. In this the judgment of the practitioner must be his guide. For subsequent attacks, or exacerbations of the symptoms, which are apt to occur at irregular intervals of weeks or months, bleeding must be employed with more reserve than in a primary attack, in consequence of the protracted course and exhausting nature of the malady. Still the practitioner must not shrink from an adequate bleeding, if the symptoms of an embarrassed or an impeded cerebral circulation threaten immediate extinction of life. When there is a doubt respecting the propriety of bleeding, small depletions of $\frac{3}{4}$ ij or iv by cupping around the occiput, at intervals of three or four days to a week, are sometimes attended with very satisfactory results. Together with bleeding, either in primary or secondary attacks, the cold dash or ice, and evaporating lotions, may be applied to the head, which, together with the shoulders, should be well raised, while the feet may be immersed in warm water, with or without mustard. After a few smart purgatives, the body should be kept moderately open about twice a day by gentle aperients. With respect to the use of mercury, it is less imperatively necessary than in acute cases; yet, from having found the chronic affection yield much more readily and certainly under its use, we now generally employ it from the commencement, exciting, however, only a gentle action, but

extending it over a long period, as six weeks, two months, or more, if necessary. Blisters, frequently repeated, on the nape of the neck and behind the ears, also setons and issues when the case becomes very protracted, are remedies of great efficacy. The diet should consist of slops and farinaceous articles in the first stage, and should seldom exceed light broths, fish, and fowl, in the more advanced stages, unless paralytic relaxation, emaciation, and paleness indicate the supervention of suppuration and softening, when the patient must be supported by richer broths or animal diet, and in some instances even by wine, in order to enable nature to maintain, if possible, a reparative process. Great perseverance is often requisite to effect a complete cure of these chronic affections. If the practitioner proceed, unwearied and undaunted, for many consecutive months, his efforts will not unfrequently be crowned with success; but if his patience fail after a few weeks, and he be tempted, from the apparently low state of the patient, to put him on full diet, failure and disappointment will commonly be the reward of his want of firmness. It is scarcely necessary to add, that after recovery the patient should for years, or if necessary even for life, be extremely cautious of exposing himself to any causes of cerebral irritation and excitement.

Treatment for Inflammation of the Pericranium. This disease, one of the forms of periostitis, often occasions acute pain from tension of so unyielding a membrane, and it is apt to be mistaken for disease within the cranium. The tenderness, however, of the scalp itself on pressure, and the absence of true cerebral symptoms, generally remove all difficulty from the diagnosis. The treatment consists in dividing the painful part or parts by an incision penetrating completely through the pericranium, and repeating it as often as the pain recurs after healing of the incision. We have seen it performed eight or nine times on the same patient with complete success.

Cerebral Symptoms from Exhaustion, resembling Inflammation of the Brain—the Hydrencephaloid Disease—Spurious Hydrocephalus. It is very important to direct attention to a remarkable affection which produces certain symptoms analogous to those of inflammation of the brain, but depends on a diametrically opposite cause; for while inflammation is an active hyperæmia, exhaustion, the affection to which we allude, is connected with anæmia—a deficiency of blood in general the system. As to the exact state of the circulation through the brain there is, as already stated, some difference of opinion. When there are throbbing headach, exalted sensibility, delirium, &c. which sometimes constitute a first stage of excitement, it is probable that there is increased circulation through the brain, but of a blood too thin and poor suitably to stimulate or otherwise act upon the organ; but when there are coma, depressed sensibility, languor, paleness, and coldness, these symptoms bespeak venous congestion of the brain; which condition moreover, with or without serous effusion, is usually found after death in such as have sunk under the symptoms in question.

It is absolutely necessary that a practitioner treating inflammation of the brain should understand this affection, because, as we have already stated, it frequently occurs as a consequence of the depleting measures employed to subdue that inflammation, and because a persistence in such measures would inevitably destroy the patient. But the disease, as will presently appear, may also occur independent of inflammation; and in children it so much resembles hydrocephalus, as to have acquired the name of *spurious hydrocephalus*, an objectionable term, because it is wholly foreign to hydrocephalus. Nor is the term *hydrencephaloid disease* scarcely less objectionable, because the symptoms do not always accord with the category denominated hydrocephalus. The disease in question has been noticed by Dr. Abercrombie, who appears to have had the first idea of it, and more fully by Gooch and Hall. We shall describe it as occurring—

1. *In infants and young children*, principally between the ages of two months and three years. The children are usually delicate and small for their age.

The disease is almost invariably traceable to some decided cause of rapid exhaustion, as diarrhœa from over-feeding, improper food, weaning, dentition, &c. purgation injudiciously and immoderately employed to remove the diarrhœa, which was of an irritable or inflammatory nature; leeching or bleeding unnecessarily, commonly in the later periods of infancy; operations on very young children. (*Travers on Constitutional Irritation*, p. 139. et seq. 1826.)

There is sometimes a preliminary stage of restlessness; irritability of temper; sensitiveness, causing the patient to be startled by any sudden noise or even by being unexpectedly touched; feverishness, denoted by heat of surface, flushing of the face, and frequent pulse; grinding of the teeth, moaning and sighing during sleep. The symptoms, so far, are nothing more than what are frequently seen as results of diarrhœa with mucous evacuations, flatulence, &c. or of dentition, worms, &c.; and they may be, equally, precursors of inflammation of the brain. If the diarrhœa continue, either spontaneously or from the administration of purgatives, the state of exhaustion is induced, and presents the following symptoms:—The infant is found lying on its nurse's arm or lap, unable or unwilling to raise its head, half asleep, one moment opening its eyes, and the next half-closing them again, with a remarkable expression of languor. The look is vacant, and not attracted by objects unusually interesting to the patient; the pupil is sluggish, and sometimes immovable on the approximation of light; the face is pale and cool or even cold; the lips are white, with a livid hue; the general surface, especially of the extremities, is likewise cooler than natural; the pulse becomes very weak in addition to its former frequency; the respiration, previously accelerated, now becomes slower, irregular, suspirious, and, before death, slightly crepitant or rattling, occasionally with stertor; the voice becomes husky, and there is sometimes a slight husky cough; there may or may not be complete coma. These symptoms, if not arrested, usually terminate fatally in two or three days. The *diagnosis* from inflammation is easily formed by the quick weak pulse, the paleness, the coldness, and the precedence of exhausting causes.

Treatment. The diarrhœa must necessarily be checked; chalk is the best remedy, to which a few drops of laudanum may be added for children above a year old; but below that age even a drop or two may produce poisonous effects. Simultaneously, with the view of counteracting the immediate sinking tendency, five or ten drops of *Spiritus Ammonia Aromat.* should be administered every three or four hours, and in the intervals five to ten drops of brandy, in water-arrowroot, should be given two, three, or more times, till the sinking tendency appears to cease; if, however, the brandy seem to gripe, it should be replaced by extra doses of *Sp. Ammon. Aromat.* The milk of a healthy nurse as nutriment is an important auxiliary; in its absence, asses' milk may be employed. So long as the sinking tendency exists, the erect posture, by which it is increased, should be carefully avoided. The coldness of the surface, and especially of the extremities, should be counteracted by keeping the little patient near a warm fire, and promoting the circulation by friction of the limbs with flannel. The room should not be close, as a current of fresh, though warm, air is highly reviving, by supplying oxygen to the too venous blood. Coma may often be promptly dispelled by a sinapism on the nape or occiput, or a blister applied for an hour or two according to the age, and repeating it, if necessary, on a different spot. When the immediate danger of sinking is over, the bowels must be brought into a healthy condition by *Hydr. cum Cretâ*, with additional chalk if they be relaxed, and by a suitable diet of nurse's or asses' milk for infants, and light liquid and farinaceous food for children.

2. In elder children, and more rarely in adults, analogous symptoms may come on in the last stage of diseases of exhaustion; especially tedious and neglected diarrhœa, and inflammation of any organ actively treated. The patient may either become delirious in any degree of violence, with a small, feeble, and rapid pulse, and an expression of paleness and exhaustion; or, for

a considerable period before death, he may fall into a state of coma, with the face pale, pupils dilated, eyes half-open and insensible to light, and the pulse feeble but distinct. This state may continue for a day or two, and either prove fatal or terminate favourably under the use of wine and nourishment. Abercrombie considers this affection to correspond with the *apoplexia ex inanitione* of old writers. It differs from syncope in coming on gradually, in resulting from causes of exhaustion operating for a considerable period, and in continuing for so long a time as a day or two; whereas syncope is induced by sudden and temporary causes, and subsides after a few minutes or hours. The *treatment* consists in the free administration of wine and nourishment, diminishing the former in proportion as the symptoms subside. In the comatose cases, we have found a large blister over the whole occiput restore the sensibility of the patient within the space of twelve hours.

3. Profuse hæmorrhage is well-known to produce symptoms analogous to the above; namely, in the first instance, there is a rapid, jerking pulse, throbbing headach, vertigo, exalted sensibility, and occasionally delirium; constituting the state denominated *reaction*. If this continue unsubdued, or if the hæmorrhage in the first instance exceed a certain point, there may be dilatation of the pupils, blindness, deafness, convulsions, coma, and death. The convulsions are spinal, as they have occurred in animals bled to death after the brain had been isolated by dividing the spinal marrow in the neck. In the *treatment*, the remedies are, opium or hyoscyamus to tranquillise the nervous system when there are symptoms of excitement; good nourishment in the form of strong beef-tea or mutton-broth, to restore fibrine to the blood; wine or brandy, if there be great feebleness of pulse, coldness, and other indications of a sinking tendency; evaporating lotions on the head, if there be heat with violent throbbing headach; and blisters on the nape or whole occiput, if there be coma. The horizontal position, with the head low, should be scrupulously maintained, until the fall of the pulse and the return of pink tint to the complexion, with a corresponding amelioration of the other symptoms, indicate that the sinking tendency has ceased and that fatal syncope from the erect position is no longer to be dreaded. The immediately urgent symptoms being removed, iron in large doses and a liberal allowance of lightly broiled mutton or beef twice a day, are the all-powerful means of dissipating the anæmia.

4. *Starvation* produces delirium, &c. on the same principles. The *treatment* is similar, except that nutriment should be given in very minute quantities and in the liquid form at first, lest, by proving too stimulant, it should excite inflammation of the stomach or brain. This is the origin of the popular notion, that retributive madness visits those who, under the reckless influence of starvation, feed upon their own species.

5. *Chlorosis*. — The anæmia of young females, when carried to a high degree, sometimes produces, not only violent throbbing headach and exalted sensibility, but even delirium. Of this we have seen several instances. Hyoscyamus, iron, and animal food, are the almost never-failing remedies.

The rapid sketch now given will perhaps suffice to show the immense importance of thoroughly understanding cerebral symptoms from exhaustion — a subject almost unknown till within the last fifteen years.

HYDROCEPHALUS.

Explanatory observations.—Two forms, acute and chronic.—*Symptoms of acute hydrocephalus.*—Division into stages or periods.—*Symptoms.*—Of the first stage.—Of the second stage.—Of the third stage.—Forms of acute hydrocephalus.—Gradual or subacute.—Rapid or acute.—Sudden or hyperacute.—*Anatomical characters.*—*Predisposing causes.*—*Exciting causes.*—*Diagnosis.*—*Prognosis.*—*Treatment.*

THE above term (from ὕδωρ, water, and κεφαλή, the head) was formerly applied to serous effusions occurring either in the scalp external to the cranium, beneath the membranes, or into the substance of the brain. It is now, however, used to express the abnormal collection of serous fluid within the cranium: hence the term *hydrocephalus* (from ὕδωρ, and ἑγκέφαλος, the brain) has been used by various writers. The circumstance of the effusion of a certain quantity of serum in the serous cavities within the cranium cannot alone be considered as constituting hydrocephalus, Magendie having shown that the presence of liquid in these situations is not always a morbid appearance. From the quantity of this fluid varying in different persons, as well as from the facility of its absorption after death, no fixed amount can alone enable us to determine the previous existence of disease. This is to be determined either by enlargement of the head, or by there having been well-marked cerebral symptoms before death.

Hydrocephalus has been described under two forms, the *acute* and the *chronic*; and although the exact limits between each cannot invariably be defined, yet as, in general, individual cases can be classed under the one form or the other, these terms are still retained. In this place we shall treat only of *acute hydrocephalus*; the *chronic* form will be described as one of the varieties of dropsy.

Although acute hydrocephalus was known to some of the older writers, it was first accurately described by Dr. Whytt, who published, in 1768, his *Observations on Dropsy of the Brain*, and gave an excellent account of the symptoms and progress of the affection. Since his time it has been considered as a distinct malady by numerous authors in this and other countries, although there still exists a difference of opinion regarding its nature.

Symptoms. In some cases the symptoms are ushered in with great rapidity and severity, constituting the *apoplexia hydrocephalica* of Cullen, and the *water-stroke* (wasserschlag) of Gölis. In general, however, the invasion is more slow, the symptoms varying in different cases. Many of these have been considered *precursory* by some writers, while by others they have been described as forming the first stage of the disease, under which, in order to prevent repetition, we shall enumerate them. For the most part these symptoms only indicate derangement of the nervous system and general health, and are not peculiarly pathognomonic of hydrocephalus. Moreover, they are very liable to be overlooked, especially in children of a scrofulous or unhealthy constitution, in whom they are often confounded with the numerous ailments incidental to strumous children. They may pass off spontaneously, or be removed by appropriate remedies, a circumstance much dwelt on by Dr. Yates, who considered them *premonitory*. In all cases, however, they demand the serious attention of the practitioner; and when there is an unusual precocity of intellect, or if the child belong to a family predisposed to hydrocephalus, their occurrence gives rise to just apprehension.

The description of acute hydrocephalus is rendered difficult by its irregular progress, and the want of uniformity in the duration and intensity of the symptoms. These circumstances have led to the establishment of certain *stages* or *periods* to mark the progress of the disorder, and to different *forms*, in order to indicate its intensity and duration.

Stages of Acute Hydrocephalus. Whytt described three stages of the disease, each characterised by a peculiar state of the pulse. In the first it is quick, in the second slow and irregular, and in the third rapid and feeble. Gölis describes four stages, founded on the presumed pathological conditions present in each; these he denominated the periods of turgescence, inflammation, effusion, and palsy. P. Frank, Conradi, and Rush, notice only two stages; and Cheyne, following the views of Whytt, describes three, but has named them from the changes which occur in the functions of the nervous system. We shall adopt this division, and describe the symptoms under three heads:—

1. The period of increased sensibility; 2. that of diminished sensibility; and,
3. that of palsy and convulsions.

First stage. The symptoms at the commencement vary considerably, and have been referred in some cases to the brain, in others to the alimentary canal or biliary organs, constituting the *idiopathic* and *sympathetic* varieties of practical writers. The cerebral symptoms (which may appear sooner or later) are usually indicated by an increase or diminution of the intellectual powers—vertigo, which renders the child liable to fall or stumble—drowsiness—disturbed and unrefreshing sleep, during which there is rolling of the head upon the pillow or grinding of the teeth—slight pain in the head gradually becoming more severe—noises in the ears—increased sensibility to light, with contracted pupils and corrugation of the brows. The gait is often unsteady and vacillating, and the child in progression often raises his foot as if stepping over some object. Sometimes there is great feebleness of one lower extremity, and the foot of the affected limb is dragged after the other. The child becomes silent and often irritable, or indifferent to former objects of interest; sometimes falling into a reverie, from which it awakens with a sigh. The intelligence, however, is not seriously affected; though there is often slowness in returning answers, yet they are correctly given. There is occasionally, however, dullness of the countenance and loss of expression in the eyes, with a dark line under them, and transient paleness and collapse of the features; sometimes alternate chills and flushes, with an unnatural degree of excitability in the whole system, and inability to sit up. The temperature of the surface is increased, the scalp feels hot, and in some cases tender on pressure, with wandering pains in the neck, limbs, or abdomen. The appetite is often defective or capricious, but there is less thirst than the degree of fever would lead us to expect. The nostrils are dry, and the lips cracked; the tongue is slightly furred, and the breath has a faint sickly or fetid odour. Vomiting occurs frequently, and is often brought on or increased by the erect posture, or by taking the child out of bed. The epigastric and hypochondric regions are sometimes tumid and tender on pressure; but as the disease advances, the abdomen falls in, and becomes flaccid. The bowels are torpid and irregular, and such evacuations as take place are of an unhealthy character, sometimes of a clay-like appearance, or of a pale or dark greenish hue, mixed with slimy matter. The urine is sometimes high-coloured and diminished in quantity, or turbid, depositing on standing a whitish sediment. The pulse at first is little altered, but occasionally it is irregular both in frequency and force. If the above symptoms be well-marked, the pulse is accelerated and excitable; but as the succeeding stage approaches, its force and frequency diminish. The respiratory organs are sometimes affected; manifested by occasional cough, irregular breathing, moaning, and sighing. The cutaneous transpiration is lessened, rendering the skin dry, harsh, and of an unhealthy colour. An eruption of minute vesicles has also been occasionally observed in this stage, or at the commencement of the next, by Formey, Gölis, Raimauer, Schmalz,

and others, principally about the mouth, cheeks, and forehead, the outside of the humerus, and the upper part of the chest.

The above symptoms are common to many of the diseases of infancy and young children, and a greater or less number of them may be present two or three weeks, or even longer, in a slight degree, without exciting any serious apprehension. It is only when they have resisted ordinary treatment, and gradually increase in intensity, that they are supposed to be the forerunners of acute hydrocephalus. The *duration* of this stage varies according to the form of the disease, from a few hours to one or two weeks, and in some cases even longer.

Second stage. The pulse now becomes irregular and of unequal force, decreasing in frequency till it falls to the natural standard, or even below it. It is, however, readily accelerated by any exertion, as sitting in the erect posture, or removal from the bed. The sensibility is also diminished, the restlessness and irritability characteristic of the previous stage giving way to somnolence and stupor, with dilatation and immobility of the pupils, squinting, and impaired or double vision. Sometimes however, as was pointed out by Odier, there are oscillatory movements in the iris, or, if it be dilated, it is sensible to the stimulus of light. The eyes are dull, heavy, and vacant; the countenance pale and collapsed; and, in a few cases, it has been observed to be œdematous. The nose is dry, the lips are pale, dry, and cracked. The countenance is expressive of indifference, stupor, or idiotism, which latter may in some measure be ascribed to the dilatation of the pupils. This physiognomical expression, according to Sprengel, is peculiar, and more distinct than in any other disease, and has even been considered by Gölis a pathognomonic symptom. The patient now lies in a soporose state, with the eyelids half closed, which is interrupted by exclamations or shrill piercing screams. The headach still continues, but the nausea and vomiting diminish, although they are liable to recur if the child is raised up. The appetite sometimes seems to return, and the little patient swallows greedily any food that may be offered. The bowels are still constipated, and fecal evacuations procured with difficulty; there is either retention of urine, or it is passed involuntarily; and in some instances there is almost total suppression of this excretion. The hands become tremulous, and are frequently raised to the head and back of the neck, or the fingers are employed in picking the nostrils, lips, or hair, or boring into the ears. As the disease advances, progressive emaciation, deep inspirations, hectic flushes on the cheeks, cold extremities, and low delirium, supervene. The duration of this stage varies from four to fifteen days.

Third stage. The pulse now becomes more frequent, often rapid, thready, and weak: it has been known to rise as high as 210 in the minute. Convulsive movements of different kinds also supervene: sometimes there are twitchings in the face with vibratory motion of the eyeballs; in other cases slight spasmodic movements in one or more sets of muscles, or convulsions more or less general. Occasionally there is paralysis of a limb, or of one side of the body, conjoined with convulsions in other portions of the muscular system. Sometimes there is greater or less rigidity in the neck or extremities, a symptom which has been more particularly remarked where there has been inflammation of the membranes at the base of the brain, or of those covering a portion of the spinal cord. The child becomes now either insensible or delirious; he moans or breathes heavily or hurriedly, rolls his head on the pillow, grinds his teeth, and waves the unpalsied hand wildly in the air. The cheeks are alternately flushed and pale; the levator palpebræ appears paralysed, and drops partially over the eye; the cornea is dim; the conjunctiva injected, and the pupil more and more dilated; the strabismus and collapse of the countenance continue; the lips become livid, and the skin partially covered with profuse perspiration, while in other portions it is dry and burning. At length the extremities become cold; the respiration unequal and stertorous; the pulse more and more weak; and death takes place very often in the midst of con-

vulsions. This event may occur in a few hours, or not before ten or twelve days after the commencement of the above symptoms.

Such is the progress of acute hydrocephalus in its most ordinary and inflammatory form. But it must be kept in view, that many cases occur in which the symptoms do not appear in the order now detailed; while some may be absent or only slightly marked, and others prominent and long-continued.

Again, in several instances the stages are by no means distinctly separable from each other. Quin and Rush, for example, relate cases which proved fatal in a few days, in which there was no evident division into stages, no dislike of light, nothing characteristic in the pulse, no dilatation of the pupils, nor any violence of headach. Sometimes patients regain their consciousness a short time before death, take food, drink without vomiting, swallow with eagerness, and even participate in amusements—circumstances which often give fallacious hopes of recovery.

It is of great importance that the time of appearance and severity of the cerebral symptoms, or those referrible to distant organs, constituting the idiopathic or sympathetic varieties of some writers, should be attended to in practice, inasmuch as they indicate the primary source of irritation, and the nature of the remedies necessary for its removal.

Forms of Acute Hydrocephalus. Dr. Cheyne considered that the disease might be reduced to three forms; which he denominated the gradual, the sudden and violent, and the secondary. Hopfengärtner describes the nervous, the inflammatory, and consecutive, which are obviously nearly the same as those proposed by Cheyne. Gölis speaks of the affection as being acute and hyperacute; Itard and others, as idiopathic and symptomatic; and Brachet, as nervous, inflammatory, and gastric. We shall consider the disease as being 1st, gradual, or subacute; 2d, rapid, or acute; and, 3d, sudden, or hyperacute.

The gradual or subacute form is of frequent occurrence, of longer duration, and is more nearly allied to the chronic affection than the other forms. It is most common between the second and twelfth or fourteenth month of infancy, and commences with the slow development of the symptoms of the first stage, which are of long continuance, though on their first appearance they are often very obscure, and merely indicative of general derangement. After a time, symptoms of the second stage make their appearance; the child seems unable to support the weight of the head, which begins to enlarge, the suture being at the same time slightly separated, by which, if it occur rapidly, the symptoms are sometimes relieved. Some few cases have occurred where, with the increasing strength of the child, all traces of the affection have gradually disappeared, but more frequently a fatal termination is the result. The symptoms are, for the most part, similar to those previously described, but are of longer continuance. The duration of this form is generally from three to six weeks; but if the commencing symptoms are taken into consideration, it is much longer, and so variable as not to be determined.

In the rapid or acute form, the first stage, although present, is not so long continued as in the gradual form, and is sometimes overlooked. The severe symptoms make their appearance more abruptly, are attended with more violent excitement of the system, and at their commencement have often been mistaken for fever with cerebral complication. There is commonly, even at first, considerable excitement; viz. fever with slight irregular remissions, a rapid, small, or hard pulse, furred tongue, severe headach, increased heat and tenderness of the scalp, hot skin, thirst, augmented sensibility, brilliancy of the eyes, and tenderness of the abdomen. There is stupor or unwillingness to be moved, alternating with violent screams, and complaints of the head and belly; retching and vomiting are readily induced by changes of position or the erect posture. There is a peculiar despondent, vacant, and heavy expression of the eyes and anxiety of the countenance, accompanied with con-

stipation, diminution of the secretions and excretions, &c. These symptoms become rapidly mingled with those characterising the second stage; viz. dilated pupils, strabismus, stupor, diminished frequency of the pulse; and soon pass into the state of collapse which distinguishes the third. Many cases supervene upon other diseases, especially scrofula, painful dentition, infantile remittent, or the eruptive fevers, hooping-cough, &c.; and hence these have been called *consecutive, metastatic, or secondary*; and should the disease commence during the continuance of these affections, its approach is often imperceptible; the early symptoms are not recognised; and it is not until dilatation of the pupil, strabismus, convulsions, or paralysis, and other advanced symptoms supervene, that its true nature is suspected. When it follows scarlatina or measles, the symptoms have been known to commence with great febrile excitement; not unfrequently however, especially during dentition, weaning, and diarrhœa, there is every symptom of debility or diminished vital action, with a weak and rapid pulse. The duration of this form differs considerably, but for the most part it seldom continues longer than three weeks, and is often fatal in less time. It is difficult to determine the duration of the consecutive cases, as the early symptoms are not observed, but when once clearly apparent they usually continue about a week.

The sudden or hyperacute form corresponds with the *apoplexia hydrocephalica* of Cullen, the water-stroke of Gölis, and the *hydrocephale apoplectique* of Guersent. It usually follows the recession of small-pox, scarlatina, measles, erysipelas, and other acute eruptive diseases, and has sometimes been noticed on the disappearance of the various forms of bowel affections in children. According to Gölis, however, it is sometimes idiopathic; and Bosc has given cases in which it supervened on paralysis in old persons, after previous attacks of hæmorrhagic apoplexy. (*Arch. Gén. de Méd.* tom. xxii. 1830.) Under such circumstances it constitutes the serous apoplexy of some authors. The first stage in this form of the disease is so slight as almost to escape notice, while the symptoms of the second come on with such violence, and so rapidly run into the third, that they can scarcely be distinguished from each other. Death sometimes occurs quickly; Gölis gives a case in which it took place in twelve hours, although this event more usually occurs between the second and fourth day.

Acute hydrocephalus has been too often supposed to be connected with one peculiar state of the vital powers, or induced by one series of morbid actions. Formerly it was thought to arise from debility, while in later times it has been considered to depend on inflammation in the brain or its membranes. Observation however demonstrates, that neither of these states are invariably connected with the disorder, and that both the one and the other may occasionally induce the disease. In this respect it resembles most affections of the nervous system; and this should be particularly attended to before determining the plan of treatment. The rapid or acute form of the disease is the one most frequently met with, and it is for the most part accompanied by active fever, and other evidences of increased action in the vital powers. But not unfrequently there is no fever whatever, the disorder often commencing under circumstances which evince a state of exhaustion, as in many of the consecutive cases, or when it occurs in advanced life. Hence each of the three forms we have described may for practical purposes be divided into two varieties, the *inflammatory* and the *non-inflammatory*. It has also been pointed out by Drs. Gooch, Hall, Abercrombie, and others, that hydrocephalic symptoms are sometimes consequent upon weaning, protracted diarrhœa, improper or imperfect feeding, and exhausting treatment. The term *hydrencephaloid disease* has been introduced to distinguish this class of cases by Dr. M. Hall, who remarks, however, that this disorder is often mistaken for hydrocephalus, and that it may be difficult to state the grounds for a just diagnosis between the two affections. The argument adduced, that recovery from hydrencephaloid disease takes place after the exhibition of stimulants and nutritious diet, is in

our opinion insufficient to warrant the conclusion, that this is a distinct affection, as similar treatment is sometimes indicated in other disorders of the nervous system. Moreover, as there are no differences in the essential nervous symptoms in many cases of acute hydrocephalus, properly so called, and this hydrancephaloid affection either during life, or in the morbid appearances after death, the propriety of such an artificial distinction is questionable. It appears to us that so long as our present arrangement of diseases continues, and pathological knowledge is not sufficiently advanced to permit our classifying them on better principles, we cannot consider them as distinct affections, but as instances of the same disease occurring in different states of the system.

Anatomical characters. The characteristic morbid appearance found after death in acute hydrocephalus, is the abnormal accumulation of serous fluid within the cranium. The quantity may be said to be abnormal when it amounts to more than an ounce, although in several cases a less quantity has been discovered. The effused serum is sometimes confined to the arachnoid or sub-arachnoid cavities, constituting the *external hydrocephalus* of some writers. In other cases it is found principally in the ventricles and central parts of the brain, forming the *internal hydrocephalus* of the same authors. In the generality of cases, however, more or less fluid is found in both situations. When the effusion is more particularly connected with the surface of the brain, it is usually found between the arachnoid and pia mater, separating the convolutions from each other. When in the ventricles they are generally enlarged, and sometimes disorganised. The largest quantity is contained in the lateral ventricles, while the posterior horns are generally enlarged, and the anterior portion of the fornix elevated, so as to cause a free communication between the third and fourth ventricles. The layers of the septum lucidum are also sometimes enlarged, and contain fluid. The serum in some cases is effused into the cellular substance of the choroid plexus, which distends the serous membranes so as to form vesicles, which somewhat resemble hydatids, an appearance often seen in the choroid plexus. The aspect of the fluid differs in various cases: in some it is clear, thin, and transparent; sometimes destitute of colour, or it may have a bluish, greenish, yellow or sanguineous tint; in other instances it is more or less opaque, turbid, whey-like, or puriform, or of various colours, as noticed by Morgagni, Baader, and others. Gölis however states, that in simple acute hydrocephalus, uncomplicated with inflammation, caries in the ear, or other diseases, he has never seen the fluid discoloured; and considers that, in such cases, the reddish tint, mentioned by some writers, must have arisen from blood poured out by wounded vessels during dissection. Occasionally shreds of coagulable lymph are found floating in the serum effused, as well as lining the ventricles, an appearance often seen in the hyperacute form of the disease, or when its course has been rapid. Baillie found the fluid in the ventricles generally clear, and purer than in other cavities of the body. With regard to the nature of the effused fluid it is, in most cases, not coagulable, as noticed by De Haen, Morgagni, Whytt, Watson, Hudson, and Marcet. Baillie, Blackhall, and others, however, were enabled to coagulate it in some instances. According to Marcet 1000 parts consist of 990·80 of water; 1·12 of muco-extractive matter, with a trace of albumen; 6·64 of muriate of soda; 1·24 of subcarbonate of soda, with a vestige of an alkaline sulphate; and ·20 of phosphate of lime, with traces of phosphate of magnesia and iron. The quantity of fluid has also been found to vary greatly, from one or two tea-spoonsful to eight or ten ounces. The most common quantity is from two to six ounces; this last amount, which Gölis has found even in the hyperacute form of the disease, is rarely exceeded.

It is rare that an abnormal quantity of fluid exists within the cranium without other appreciable lesions, which in most cases are of an inflammatory nature. Thus, there is sometimes adhesion between the skull cap and dura mater, more rarely between the layers of the arachnoid. This latter mem-

brane is not unfrequently found dry, thickened, and opaque, and when the inflammation is severe, the vessels of the sub-arachnoid cellular tissue are very commonly much injected, a lactescent serosity, or sero-gelatinous, or sero-purulent fluid, being at the same time effused. If the inflammation has been very acute, there are occasionally small plates of concrete pus extended in a membranous form over the surface, which Charpentier has once seen traversed by blood-vessels, and consequently organised. When purulent matter is formed between the arachnoid and pia mater, it is most frequently found between the fissures of Sylvius, on the decussation of the optic nerves, in the neighbourhood of the infundibulum, and around the cerebellum and commencement of the spinal cord. Sometimes the inflammation descends into the vertebral canal, and gives rise to analogous products. The pia mater is often highly injected, having a net-work of florid vessels more or less extended over its surface, occasionally with patches of extravasated blood. It is sometimes more adherent to the brain than natural; in other instances it is more easily separated from it. Ruzfz, Gherard, Dance, and Piet, have observed it sprinkled to a greater or less extent with hard, grey, or yellowish semi-transparent granulations, which by some have been considered to be the enlarged glands of Pacchioni, by others to be coagulable lymph, or miliary tubercles. We have several times had occasion to observe these bodies in children who have died labouring under meningeal inflammation, and in every instance tubercles were found in other organs. Similar observations have been made by Piet and others, so that it is more than probable that these granulations are miliary tubercles, and that their presence ultimately excites inflammation and its consequences.

The substance of the brain in acute hydrocephalus is usually softer than natural, more especially in the central parts; but it sometimes retains its natural firmness. Gölis mentions that in one case, in which a small quantity of water only was found, the mass of the brain expanded on removing the skull cap; so that a few minutes after, when he attempted to place the portion of the cranium which had been sawn off over the brain still inclosed within its membranes, the cerebral mass could not be contained within it. Laennec, Dance, and others, have remarked, that in some cases the convolutions have been flattened, apparently from their being pressed against the osseous walls of the cranium. On cutting into the brain it not unfrequently presents more or less indications of congestion, the cut surface being studded with bloody points, but sometimes it is paler and less vascular than usual. In either case it is often mingled with serous infiltration. Cheyne noticed the increased moisture on making sections of the brain, and Gölis relates that once, on cutting the hemisphere, a coloured serum flowed freely from it; and that, when the cerebral mass was compressed, a reddish fluid exuded as from a sponge. The grey substance of the convolutions is occasionally injected, so as to give an appearance varying from a pale rose to a lively red colour. Charpentier states that this lesion frequently escapes the researches of morbid anatomists, but that it is rarely absent when the sub-arachnoid tissue is strongly injected. The white matter in the neighbourhood of the ventricles, including the septum lucidum, fornix, and adjacent parts, have been found softened in different degrees, from the slightest want of natural consistence to that of cream. The lining membrane of the ventricles also has been found vascular, opaque, or covered by layers of coagulable lymph. It is often readily separated from the subjacent cerebral substance, and is sometimes covered with numerous white flocculent filaments, which become very apparent by their floating, when the membrane is placed in water. This disorganisation has been supposed in many cases to give the fluid its turbid appearance. The plexus choroides is not unfrequently injected, thickened, or covered with granulations; sometimes it is pale and discoloured, with small serous cysts resembling hydatids. Occasionally the septum lucidum is lacerated, establishing a communication between the lateral ventricles. The cellular membrane in the structure of

the pituitary gland has been found distended with serous effusions in the form of little bladders. (*Joy.*)

It must not on the other hand be forgotten, that in some cases, instead of increased vascularity of the brain, it has been found particularly pale, and, with the exception of serous effusion, free from every other morbid appearance. This more particularly occurs when the disease arises from debility and exhaustion. Several well-marked examples of acute hydrocephalus have been recorded by Abercrombie (*Researches on the Brain*, &c. cases 63—66.), Breschet (*Journ. de Méd.* tom. xxix. p. 151.), Brichteau (*Arch. Gén. de Méd.* 1824), and Andral (*Clin. Méd.* tom. v. obs. 20—22.); in which, after death, there were no traces of inflammation either in the membranes or substance of the brain. These are recorded in such a careful manner as fully to establish this fact, and refute the supposition, that in such instances the examinations were not made with sufficient accuracy.

Various chronic alterations of structure have been also occasionally found in the brain, which may have assisted in exciting the disease. Laennec has pointed out the existence of granular tubercles in the cerebrum, cerebellum, and optic thalami, and the coexistence of tumours of a schirrous, encephaloid, or fungoid nature; abscesses, apoplectic cysts, spiculæ of carious bone, &c. have been mentioned by others. Coindet has observed, what has since been noticed by Dance and others, that, besides the serous effusion in the ventricles, there was more or less also in the spinal canal. This no doubt is often the case, and is explained by the ready communication which exists between the spinal canal and the serous cavities of the brain. That it is not more frequently seen, arises probably from the spinal canal being seldom carefully examined.

Numerous alterations have been found in other organs, which by some writers have been considered to be connected with hydrocephalus. Dr. Cheyne has pointed out the frequency of disease in the liver and intestines. The liver has been found enlarged, and adhering to the neighbouring parts by organised lymph. Of eleven cases of hydrocephalus examined after death by Dr. A. T. Thomson, traces of inflammation of this organ were found in nine, inflammation of the colon in the tenth, and invagination of the jejunum in the remaining one; in four cases also, recorded by Mr. Cooke, the liver was diseased in three. Tubercles have also been found both on its surface and in its substance, as well as in the splenic, mesenteric glands, and other organs. The mucous membrane of the alimentary canal has been occasionally found more or less inflamed, the glands of Peyer much developed, and different parts of the intestinal canal contracted. In sixteen cases dissected by Dr. Blackhausen of Bremen, the mucous coat of the stomach was softened in all, and the internal surface of the intestines studded with diseased follicles, from which pus escaped. Invagination of the small intestines also has been found by different authors.

Causes. Among the predisposing causes the doctrine of hereditary predisposition has been strongly advocated by Quin, Odier, P. Frank, Portenschlag, Baader, Gölis, and others. That the disease occurs frequently in more than one child of the same family is a matter of common observation. Underwood says he has known six children, born of the same parents, die successively at the age of two years, five of whom were examined after death (*Diseases of Children*, 9th edition, p. 298.); and Dr. Cheyne mentions ten children in one family having died of the disease. Great terror and anxiety on the part of the mother during the last months of pregnancy is placed by Gölis among the predisposing causes. He states that he, as well as other physicians, had an opportunity of observing this when Vienna was bombarded in 1809, as most of the children who were born after this catastrophe were seized about ten, twenty, or thirty, days after their birth with convulsions, and died. These views, however, have never been confirmed by any other authority. Hydrocephalus is more frequent during the period of infancy and childhood than at any other age. This circumstance has been generally attributed to the rapid

development of the brain, and the great nervous sensibility which then prevails, rendering the economy particularly liable to be acted on by the exciting causes. From the tables of Percival and Bricheteau, it appears that the disease is most common between the second and fifth year, but it is not unfrequent between the fifth and twelfth. Cases, however, are met with in infants at the breast, and several are recorded by Dance and others between the ages of twelve and thirty-one. Dr. Gregory has related a case caused by a fall, at the age of forty. (*Ed. Med. and Surg. Journal*, Oct. 1834.) It becomes more and more rare, however, as the individuals approach adult life; but in advanced age it again becomes rather more frequent, deaths from acute hydrocephalus (often called *serous apoplexy*) being then occasionally met with. It has generally been observed, that children with large heads and precocious intellects are peculiarly liable to the disease. Underwood, however, says that children with large heads do not seem to be more predisposed than others; but the observations of Gardien, Hopfengärtner, and Guersent, have confirmed the popular opinion. The peculiarity of sex does not appear to exercise much influence in the production of the disease. Ludwig and Cheyne have thought that, after ten, girls are more liable to it; and, according to Dr. Copland, before that period it is most common in boys. A scrofulous habit powerfully predisposes to the disease, a large proportion of cases occurring in strumous children. This has been especially remarked when the affection has appeared in several members of the same family. Dr. Cheyne considered that to the strumous diathesis must be attributed the hereditary disposition to hydrocephalus, which is so strongly marked in some families. It has also been observed by this author and Sprengel, that hydrocephalus and scrofulous affections are mutually convertible into each other. It is true that hydrocephalus sometimes occurs after the disappearance of scrofulous affections of the glands, joints, or lungs; but there are strong doubts whether hydrocephalus has ever induced the latter disorders. Some think that the disease is most frequent in children with a fair skin and hair, pink complexion, and blue eyes; but, according to Cheyne, it is most common in those with dark eyes and a dark complexion. It is very often seen in both.

The circumstances, however, which induce arterial or venous cerebral congestion are the most frequent predisposing causes of hydrocephalus; such as administering spirituous liquors to infants when suckling; the abuse of narcotic remedies, too often employed during infancy; keeping the head too warm; a too stimulating diet; violent mental emotions, as terror, anxiety, anger, fear, &c.; too much mental exertion in young children; exhausting discharges, as from the bowels, or undue loss of blood; insufficient nutriment; impoverished quality of the nurse's milk; injudicious employment of drastic purgatives or emetics; or, in short, any circumstances which tend to depress the vital powers.

Irritation in distant organs also appears to predispose to hydrocephalus, such as that which arises from dentition; worms in the alimentary canal; acute or chronic diseases of the stomach or intestines, or of the biliary organs; enlargement of the mesenteric glands, constipation, &c. Among the other predisposing causes may be noticed previous attacks of cerebral congestion or inflammation; or of diseases of the respiratory organs. Hydrocephalus also may form a complication, or become one of the sequelæ of infantile remittent or exanthematous fevers, especially scarlatina. It is stated by Itard, that of the two years in which he had remarked the frequency of acute hydrocephalus, one was characterised by an epidemic scarlet fever, and the other by an ataxic fever, which particularly affected infants.

The circumstances mentioned above, inducing cerebral congestion, debility, and irritation, may act also as occasional *exciting* causes. The suppression of eruptions on the scalp and behind the ears has often been known to occasion the disease. Göllis even supposes that the diminished frequency of these eruptions has rendered hydrocephalus more common now than formerly. The

affection has also been known to follow falls or blows on the head; the extension of inflammation from the ear; the sudden suppression of chronic evacuations, or accustomed discharges, as from ulcers, cutaneous eruptions, epistaxis, or of the menstrual secretion; carrying heavy loads on the head; jumping and other bodily concussions; hanging by the feet with the head downwards, with other feats performed by rope-dancers, as remarked by Gölis, Odier, Hufeland, and others. Rush, Lettsom, Gölis, and Coindet, have given cases in which the hydrocephalic symptoms were apparently connected with rheumatism, or with inflammation of the throat, neck, lungs, pleura, peritoneum, or abdominal viscera.

Diagnosis. The difficulty of distinguishing hydrocephalus in the very early stage from the various acute infantile diseases is admitted by all practical physicians. In the acute diseases of infancy and childhood, every symptom which indicates cerebral irritation should be carefully noticed, since in the early stages curative measures have the best chance of being permanently beneficial in arresting the progress of a disease too often formidable. Whenever, therefore, infants and young children are observed to be wakeful both by day and night; to cry for hours together without apparent cause, or disease, that can be discovered; if the fecal evacuations be unhealthy, and ordinary treatment fail in restoring their natural appearance; and if the urine be at the same time scanty, there is strong suspicion of some affection of the brain, which, if not treated energetically at the onset, may terminate in hydrocephalus. Again, if at any period in the course of an acute disease the child falls into a state of insensibility, with rolling of the head on the pillow, grinding of the teeth, and screaming, the attention of the practitioner should be instantly directed to the head.

Acute hydrocephalus in children not unfrequently resembles some of the various febrile disorders to which they are so liable. From these it may however in general be distinguished by the starting and peculiar scream; the expression of anguish in the countenance when the child is roused; by the constant drowsiness; the knitting of the eyebrows; the pain in the head, occasionally darting through the brain, and rendering the child very cautious in moving; by the hands being frequently raised to the head, and the neck being thrown back; frequent and deep sighing; by the irritability of the stomach, increased by the erect posture and by motion; and by the obstinacy of the bowels, and the character of the alvine evacuations. The subsequent progress of the disease soon clears up the doubt, and exhibits its peculiar character.

Typhoid fever is rare in children, and when present may be recognised by the supine posture; the absence of acute headach; the low muttering delirium; the dark brown sordes on the teeth and gums; the dark and fetid character of the evacuations; the more equable pulse; and the absence of convulsions or palsy. The febrile affection produced by vermination (denominated *worm fever* by some writers) may be distinguished by its irregular course and remissions; by the dull and obscure headach; the pulse being uniformly quick; the senses of sight and hearing unimpaired; the sleep sound; the appetite voracious; the tumidity of the abdomen; the copious and spontaneous alvine evacuations; and the pale and abundant urine.

It is often a matter of great difficulty to distinguish hydrocephalus from infantile remittent fever. Some authors doubt the possibility of an accurate diagnosis in children under five years of age, until the enlarged pupil and coma indicate with too great certainty hydrocephalic effusion. In the early stage of hydrocephalus the prominent signs are the irritability of the stomach; the continued severe headach; aversion to light; drowsiness; screaming in sleep; and evident uneasiness in moving the head, evinced by frequently raising the hand to the head; the contraction and subsequent dilatation of the pupils; the variation in the pulse; the little aversion to food, which is generally taken readily and without reluctance; and by the state of the bowels, which, though occasionally disordered, are easily acted on. The distinct stages of the disease

are also diagnostic of hydrocephalus. In infantile remittent fever, on the other hand, the pulse is quick throughout the course of the disease, never falling below the natural standard; there is seldom vomiting, except as an accidental occurrence; the appetite for food is lost, and nourishment refused; the belly is tumid from flatulent distension; the nostrils are dry, with constant itching of the nose; the bowels are acted on with much difficulty; the evacuations are unhealthy and extremely offensive, and mixed with portions of undigested food and shreds of lymph; the exacerbations and remissions of fever are irregular but well-marked, the child during the intervals being often lively and playful. The irritation in the bowels sometimes induces convulsions at an early period of the disease, but after the fit, the complete restoration of the faculties without permanent palsy, and the preceding symptoms, indicate their origin in intestinal irritation. Dr. Joy (*Cyc. Prac. Med.*) has well remarked, that amidst our efforts to establish a diagnosis in any particular case, we must not forget that diseases are at times, in the language of the older writers, convertible into each other; or that, to use the more modern phrase, complications may arise in their course, and the secondary affection eventually predominates over the original. It is thus that in the course of infantile fever hydrocephalus frequently comes on, and often with such insidious advances, as altogether to elude observation almost up to the very last moment of its fatal termination.

Prognosis. Whytt, Fothergill, and other writers, who first described the disease, considered it as uniformly fatal. It is well known, however, that cases have recovered even when very unfavourable symptoms, such as strabismus, dilatation of the pupils, blindness, palsy, convulsions, stupor, involuntary evacuations, &c., have been present. When detected at an early period, however, and energetic and judicious treatment has been employed, the comparative number of recoveries has greatly increased. Of thirty-seven cases recorded by Gölis, five recovered; and that physician, in the course of his extensive practice, has known permanent restoration of health to take place in forty-one instances. Odier says, that at Geneva about eighteen children on an average are annually attacked, of which six, or one third, recover. Of twenty-eight cases recorded by Mills, seven terminated favourably; and of eleven given by Bricheteau, four recovered. These facts hold out much encouragement to the practitioner, while a knowledge that individuals have recovered when in the last stage of the disease should stimulate him to continue his efforts, although they may be apparently hopeless.

In forming our prognosis, great attention should be paid to the circulation. If the pulse from being quick, fall slowly and moderately, our opinion of a successful termination will be more favourable than when it becomes suddenly slow. Should the pulse, on the other hand, have been preternaturally slow, a slight increase in its frequency may be considered a propitious circumstance; a rapid and very considerable rise, on the other hand, indicates the commencement of the last stage. Great caution, however, is necessary in prognosticating from the pulse, as many practitioners have supposed the fall of the pulse a favourable sign, when it proved to be the forerunner of the fatal termination.

It has generally been supposed that when effusion has once taken place, the disease is hopeless — an opinion that doubtless has tended to increase its mortality. So long, however, as the general strength is not too much exhausted, the pulse continues steady, and the breathing natural, the most alarming symptoms should not prevent the employment of active remedies. Dr. Copland affirms that the supervention of hurried breathing is the only symptom which should lead us to despair of the case. When the disease appears in children of a previously sound constitution, or after an attack of some acute disorder, its termination is generally more happy than when it occurs in scrofulous or weak individuals.

The favourable signs are the improved appearance and natural odour of the stools, an increased flow of urine, mucous or watery discharges from the nose, or an abundant perspiration. None of these individually, however, should

be depended on; profuse perspirations, for example, whether partial or general, often precede the fatal termination. In many cases, also, apparent improvement is observed, which continues one or two days; but this amendment is often followed by a relapse, which proves fatal. Even when the amendment is longer continued, a favourable result cannot be confidently anticipated until the iris recovers its sensibility, the alvine excretions resume their natural odour and appearance, and the other marked symptoms become greatly diminished.

Among the unfavourable symptoms may be noticed the accession of hydrocephalus in individuals of a weak and debilitated constitution; its slow progress, so as not to be recognised until far advanced; total insensibility of the retina; dryness of the mouth, lips, and nostrils; great rapidity, smallness, and feebleness of the pulse; hurried respiration; partial sweats, particularly on the neck and back of the head, &c.

Treatment. We have already stated that at an early period it is impossible to determine whether the symptoms be those of acute hydrocephalus, or of other affections to which they are common. This fortunately is of little consequence in a practical point of view, as the treatment of these symptoms must be guided by the same general principles, whatever be the morbid conditions which may subsequently arise. There is every reason also to believe, that when the disease is threatened, or when the incipient symptoms have come on, the judicious administration of remedies has often prevented the development of hydrocephalus; consequently, it is of great importance that the earliest symptoms should be properly and actively combated. Sometimes also it becomes a matter of importance to counteract a predisposition to the disease. With this view every means should be adopted to produce regularity in the secretions and excretions in young infants by means of a healthy nurse, and at a later period by strict attention to a proper diet and regimen, combined with sufficient exercise. As the intellectual powers expand, great care should be taken to prevent their being too early exercised, especially in children whose mental powers are precocious, and recreations that demand more bodily than mental exertion should be selected. Should the health become affected, and incipient cerebral symptoms supervene, attention must be paid to the state of the bowels and cutaneous transpiration. If the former be deficient in quantity or of an unhealthy character, castor oil, Hyd. c. Cretâ, either alone or combined with small doses of rhubarb or jalap, according to the age of the patient, should be given occasionally in appropriate doses. If the skin be dry, James's powder, with or without calomel, will tend to restore it to its natural state. The various forms of counter-irritation, with the view of exciting an artificial discharge from the nape of the neck, occiput, or upper part of the arm, by means of issues, moxas, or repeated blisters, have also proved highly serviceable in diminishing cerebral symptoms, even in children hereditarily predisposed to the disease. Dr. Cheyne supposed that the disease was more easily guarded against in such families—a circumstance which, if true, Dr. Joy has with much reason supposed to depend on the readiness with which the parents detect the incipient symptoms.

As soon as there is reason to suspect the invasion of the disease, the patient should be placed in bed, in a tolerably large chamber, screened from strong daylight, well aired, and of moderate temperature. The bed should be formed into a slightly inclined plane, from which, when necessary, the patient may be slowly raised, and gently laid down again. The head ought to be somewhat more elevated than the feet, and the bed-clothes not too heavy, but only sufficient to preserve the natural heat. All quick and sudden movements of the patient must be prevented, and in children every thing which is likely to irritate should be carefully avoided. The necessary medicines are to be administered by soothing and persuasion, and every thing approaching to force guarded against as much as possible.

The indications in the treatment of acute hydrocephalus, are, 1. To remove

all sources of irritation. 2. To equalise the circulation within the cranium. 3. To moderate the pain, vomiting, and convulsions, even when the two first indications cannot be accomplished; and, lastly, to support the strength in the advanced stage of the disorder.

In endeavouring to equalise the circulation in the brain, it is necessary to take into consideration the constitutional powers of the patient, the form of the disease, and the nature of the symptoms which have preceded, or accompany, the cerebral affection. If the pulse be strong, the head symptoms well-marked, the constitution vigorous, *bloodletting* should be freely employed. Copious venesection is under such circumstances necessary, and in the early stages of the disease has been known to relieve the pain of the head, reduce the fever, and induce a state of the system highly favourable to the action of other remedies. Dr. Maxwell opened the jugular vein, while the patient was in the horizontal posture, and stopped the flow of blood from time to time with his finger, so as to obtain a considerable quantity of blood before syncope was induced. This was continued until the pulse could not be felt, and insensibility was occasioned. By this bold practice sixty out of ninety cases are said to have recovered. Most of these, however, were instances of cerebral inflammation; and it is impossible to know whether any of them would have terminated in effusion. Such severe practice, if indiscriminately employed, is not free from danger: excessive exhaustion, indeed, is well-known to occasion convulsions, and other hydrocephalic symptoms, and even produce the very effusion the remedy was intended to prevent. Mr. Cooke observed, that whenever bleeding had been carried to a large extent, although it temporarily relieved the patient's condition, a proportionally larger quantity of fluid was effused. (*Med. Rep.* vol. ii.) Dr. Rush employed this remedy more moderately, and in the same manner as in the treatment of phrenitis. We have previously stated, that, in the early stages, the disorder cannot be distinguished from inflammation, or an active state of congestion; and whenever bloodletting is indicated, the same rules which guide the practitioner in the treatment of those pathological states, should govern his conduct in the management of the disease under consideration. The quantity of blood taken must be regulated by the effect produced upon the pulse, and the general appearance of the patient. In children, the diminution of heat and colour in the cheeks furnish valuable indications of its effects. It is a safer practical rule to repeat the bleeding should the pulse again rise, than, by a too copious detraction at first, run the risk of producing exhaustion, from which the individual is with difficulty restored. This should be more especially taken into consideration when the disease arises in the progress of other acute affections; but when the symptoms depend on primary cerebral inflammation, bloodletting may be employed with greater freedom. It is unnecessary to remark, that this remedy is almost inadmissible in the advanced stage of the affection, though Dr. Cheyne has adduced instances in which even then a moderate bleeding has been useful, especially when pain in the head and vomiting have been prominent symptoms. This physician, however, does not advocate very active bloodletting at any period of the symptoms; and Drs. Garnett and Porter are even hostile to its general abstraction, considering the application of leeches or cupping-glasses to be all that is necessary. This mode of abstracting blood should be trusted to only in the treatment of children under three or four years of age, and even in them should not wholly be relied on, when the indications for bloodletting are well-marked. Dr. John Clark prefers cupping to leeches, and informs us, as the result of his experience, that although very young children may bear loss of blood to syncope once or twice, they are apt to sink if it be carried beyond this limit. In infants of a year old he thinks the abstraction of three ounces enough: this may be repeated in twelve hours if necessary. This may be considered the standard quantity to be taken at that age, unless peculiar circumstances arise which render it necessary to increase it. When leeches are preferred, it is not material to what situation in the neighbourhood of the head

they are applied. Kuhn recommends the inner angle of the eye; others have advised the temples, behind the ears, the angle of the jaw, or nape of the neck.

It should be kept in mind, that the more early bloodletting is employed, the greater is the chance of its proving beneficial. On the other hand, cases occur in which it should be used with extreme caution, especially in the consecutive forms, when the pulse does not appear much increased in force, and the general strength is somewhat reduced. It is positively injurious when the symptoms appear after long-continued diarrhœa, or other causes of exhaustion; and it should never be prescribed when the appearance of the patient and diminished strength of the pulse indicate debility.

Cathartics are of great service, especially after bloodletting has been employed, and may be administered freely in most cases in which the latter remedy is indicated. They are useful in all forms and stages of the disease in procuring healthy evacuations, and thus removing or preventing the irritation which accumulations in the digestive canal are likely to produce, as well as producing derivation from the general mass of blood, but more especially from the vessels of the head, as is shown by the pallor of the face, after the operation of a brisk purgative. Indeed, according to the experience of Abercrombie, the judicious exhibition of purgatives is little, if at all, inferior to bloodletting, in arresting almost every manageable form of cerebral disease. He states, that "although bloodletting is never to be neglected in the earlier stages, more recoveries from head affections of the most alarming aspect take place under very strong purging than under any other mode of treatment." (*Diseases of the Brain*, p. 153.) Similar testimony to the good effects of this practice is borne by Whytt, Rush, and others. Active purgatives are contra-indicated, however, if there is great irritability of the stomach, and mucous membrane of the intestines. If, under such circumstances, purgatives increase the vomiting and general irritation, or produce watery stools of an unhealthy appearance, their exhibition should be postponed, until, by bleeding and other remedies, these symptoms have been removed or alleviated. Of the various remedies of this class, calomel has been much employed, with the view of inducing a free biliary secretion. In general it is necessary to combine it with some other purgative. Gölis prefers *toasted jalap*, as it does not so readily excite colic pains. Should the calomel produce much intestinal irritation, Dr. A. T. Thomson recommends the *Hyd. c. Cretâ*, with powdered colchicum.

Dr. Cheyne found one or two drachms of magnesia, saturated with lemon-juice every two or three hours, sit well on the stomach, even when it was irritable, and to act freely as a purgative in most cases. *Elaterium* has been employed by Dr. Elliotson, and may be given in the acute forms of the disease, when it is deemed advisable to lower the general powers by acting briskly on the bowels. It is very liable, however, to produce severe sickness and vomiting, which renders its employment less advisable; and when the stomach is irritable, it should never be thought of. The regular and steady exhibition of calomel at stated intervals—longer or shorter according to circumstances—interposing a solution of any of the neutral salts in infusion of senna, so as to insure its free action, will be followed in most instances, by the most beneficial effects. Some prefer the *Hydr. c. Cretâ* as a milder preparation: it may be given in combination with rhubarb, jalap, or scammony. Dr. Abercrombie has found the croton oil eminently successful in evacuating the bowels, and it has the great advantage of being easily administered; one or two drops smeared on the tongue being generally quickly followed by copious watery stools. In the *non-inflammatory* varieties of the disease, and when there is debility, powerful cathartics should be withheld, and gentle aperients, such as the neutral salts, with senna, rhubarb, &c. employed. Dr. A. T. Thomson says he has found obvious advantage from a long-continued course of the wine of aloes, combined with an alkali. When evacuations are procured with difficulty, emollient clysters, containing suitable doses of the saline purgatives,

or, if there is debility, the turpentine enema, will often prove highly efficacious, and tend much to assist the operation of other cathartics. These preparations also are beneficial when there is irritation in the lower part of the alimentary canal.

Cold applications to the head should also be used in conjunction with the above remedies, and in order to permit their more effectual application, the head should be shaved. The most convenient and effectual mode of applying cold, as well as that which causes least trouble, is by means of bladders filled with snow or pounded ice; but if this cannot readily be procured, cloths dipped in cold water, or a refrigerating mixture, should be constantly applied to the shaved head. Evaporating lotions, containing spirits of wine and æther, may also be used, or a stream of cold water directed on the head, and continued as long as the heat of the surface remains. This last method is a most powerful means of subduing cerebral excitement, and applicable to the more violent forms of the affection. Dr. Darwall has known cases which seemed hopeless recover by letting water drop in a small stream on the head; and Formey employed it every two hours, for several consecutive days and nights, with the best effects, even when it was supposed that effusion had taken place. Abercrombie also strongly recommends its employment, and has found it very successful in the coma of children arising from congestion, and in cases attended with convulsions. In some instances the action is favoured by the simultaneous employment of warm or tepid pediluvia. Care should be taken, during the employment of the cold applications, that they should not be continued after the increased temperature of the surface has been permanently reduced, as, under such circumstances, they are powerfully sedative, and may, according to Burns and others, produce an alarming state of collapse. The utility of this remedy is best observed in the early stages of the disorder, when the temperature of the scalp is increased; and at that period the experience of Rush, Quin, Conradi, Formey, Gölis, and a host of practitioners, has established it as one of great efficacy.

Antimonials. Large doses of the tartrate of antimony have, in a few instances, been given after the method of Rasori with success. Laennec cured three cases of cerebral affection in this manner; but as the symptoms which occurred were not sufficiently well-marked to indicate that effusion had taken place, they cannot be considered as decided illustrations of hydrocephalus. Dr. Mills also gave tolerably large doses of this preparation, with a view to relieve the headach and lower the pulse; and, if the stomach was irritable, he combined it with the tincture of opium. The generality of practitioners, however, have not derived much benefit from this practice; and Guersent remarks, that these large doses of antimony have always seemed to him to irritate the intestinal canal, increase the cerebral symptoms, and aggravate the enteritis, which often coexists with meningitis of the base of the brain. Antimony is now given chiefly as a sudorific, and for this purpose James's powder is the preparation chiefly employed. It may be combined with calomel and opium, or with cathartics, a mode of administration much recommended by Dr. Cheyne, who considered that by these means the inflammatory action in the brain was reduced, while at the same time the abdominal and cutaneous secretions were promoted.

Mercury has been extensively employed in hydrocephalus since it was first introduced into practice by Dr. Dobson, with the view of subduing inflammation, or favouring absorption when effusion has taken place. Notwithstanding many practitioners have extolled this remedy, and some cases have appeared to owe their recovery to its administration, there are many doubts whether the good effects which have followed its employment are really to be attributed to its use. True it is that in numerous cases no benefit has resulted, although mercury has been given in the most judicious manner, while in others recovery has taken place, although it has not been employed at all. Though mercury may be said to be a powerful auxiliary in the treatment of cerebral

inflammation, its warmest partisans do not trust to it alone; and when the pulse is strong, the fever great, and the inflammatory symptoms well-marked, our chief reliance must be placed on bloodletting, cathartics, and other anti-phlogistic measures. Most practitioners however are agreed, that it may be beneficially employed to stimulate the absorbent vessels, and numerous cases are recorded in which the effusion, even in chronic hydrocephalus, has sensibly diminished under its exhibition. With this object it may be given in the inflammatory variety, after depleting measures have been had recourse to; and in the advanced stage, or when it depends on exhaustion or debility, in combination with opium or hyoscyamus. Different preparations have been recommended. Calomel is the one usually employed, in doses of one or two grains repeated every third or fourth hour, until the gums are affected. Dr. Merriman and some others however, in order to produce the mercurial effect with greater rapidity, have given corrosive sublimate in doses of one sixtieth to one thirtieth of a grain, repeated every four or six hours. In urgent cases the external may be combined with the internal administration, and half a drachm to one drachm of Ung. Hydrargyri rubbed on the thighs, or any portion of the surface, three or four times a day. In infants three or four grains of calomel may be rubbed on the gums every three or four hours, when it is thought of importance to bring the system rapidly under its effects. Blistered surfaces may also be dressed with mercurial ointment, or the mercurial liniment on warm poultices may be applied to them.

In whatever way mercury is employed the state of the gums, mouth, or tongue, should be carefully noticed, as salivation, if carried too far, may induce sloughing of these parts, which is at all times a source of great irritation. Its effects on the bowels should also be watched, especially when calomel is given: if griping and diarrhœa are occasioned, it must be discontinued, or the Hyd. c. Cretâ substituted. Gölis, who considers that the doses generally given in England have occasionally produced fatal enteritis, administers only half a grain to two grains every two hours, until it produces four or five green slimy stools, or colic, when the medicine is discontinued until these effects have ceased. Children under three years of age, however, are salivated with great difficulty. Dr. Clarke could never produce it in them, although he has frequently tried to do so. Gölis says also, that, under one year, children bear large doses of calomel without either colic, diarrhœa, or salivation. Should apparent benefit result from the use of mercury, it should not be left off suddenly, but discontinued gradually, by diminishing the dose.

Iodine has also been used to facilitate the absorption of the serous fluid, and in some cases with success. It appears to act most beneficially when combined with mercury, as in the proto-ioduret of that metal. This may also be used in the form of ointment. The binocide of mercury thus employed, in addition to any absorbent properties it possesses, combines the advantages of counter-irritation; but care must be taken to prevent salivation. Iodine, when combined with diuretics and tonics, has been found useful in assisting their action.

Narcotics. Opium has been employed by some physicians in the second and third stages of hydrocephalus to lessen the acute pain in the head, convulsions and irritability of the stomach and intestines, and may be given with this view at an early period, when the disease depends on exhaustion and debility uncomplicated with inflammation. It has often succeeded in effecting this without in any way interfering with the action of other remedies, or inducing constipation, when moderately employed. At the early part of the second stage, it may be given with calomel, James's powder, or the tartrate of antimony, in doses varying from the eighth to the fourth of a grain every four hours. If there is much irritability of the bowels, it is best administered in the form of Dover's powder combined with Hyd. c. Cretâ. According to Crampton and Cheyne, contraction of the pupils, following the exhibition of this remedy, indicates that it has been pushed sufficiently far. In some cases hyoscyamus

may be given with the same view as opium, especially if the latter appear in any way to increase the cerebral irritation.

Digitalis was first employed by Dr. Withering, and has since been used by Brown, Whytt, Cheyne, and others, to subdue the excitement of the first stages; and, when effusion has taken place, to favour its absorption. Much uncertainty, however, prevails regarding its effects, as it is often difficult to determine whether the deranged cerebral functions, vomiting, and irregular pulse, be consequent upon the remedy, or the original disease. Dr. Cheyne was of opinion, that when the slow irregular pulse of the second stage becomes small and sharp, it is the effect of digitalis, and is readily distinguished from the pulse in hydrocephalus, which is soft and full. He also attempted to draw a distinction between the brain affection arising from the exhibition of digitalis, and that of hydrocephalus, from the vertigo and momentary blindness of the former, and the continued coma of the latter. But it is impossible to make out these distinctions in practice, and the greatest caution is necessary to guard against the too long continuance of this often powerful sedative. Dr. Cheyne gave the tincture, commencing with ten drops, and adding two or three to every succeeding dose, which was given at intervals of four hours. His object was to bring the system perfectly under the action of the digitalis in one or two days, and he has given as much as 120 drops a day to a child only four years old. In the first stage this is the best method of administration, but in the second it may be advantageously conjoined with squills and other diuretics, as advised by some of the German writers. Gölis and Merriman recommend half a grain of digitalis in powder with a grain of calomel every four or six hours. Windelstadt combined it with opium, and Kleber rubbed it over the scalp with Vinum Scillæ. Colchicum has been given with the same intentions as digitalis, but does not appear to be so efficacious, or to have been so extensively tried.

Diuretics have been thought useful auxiliaries when effusion has taken place. Among other remedies of this class, squills, colchicum, Sp. Æther. Nit., Sp. Junip. Co., &c. have been employed. When the stomach is irritable, care should be taken that the vomiting is not increased by the injudicious use of these medicines. In some cases they may be advantageously combined with opium, and in others with restoratives and tonics. Brichteau and several foreign writers warmly recommend squills as the most powerful diuretic in this disease; but, according to Copland, turpentine in the form of enema, or liniment rubbed on the scalp, is the most energetic.

Derivatives and counter-irritants have been extensively employed in hydrocephalus, and if judiciously applied are productive of great benefit. They are for the most part only required in the second stage, but have been used in the first when there is little fever, and when there is coldness of the lower extremities. Blisters have been most commonly employed as a counter-irritant, although the best period and proper situation for their application has been much disputed. In the first stage of the disease they are contra-indicated if there be much febrile disturbance, restlessness, or muscular excitement; but should the febrile excitement be moderate, they are best applied at some distance from the head, as between the shoulders, or to the legs or arms. The utility of blisters in the first stage, however, is at all times much to be distrusted, unless the cerebral affection appears to have been induced by disorder of the digestive organs; in which case, should tenderness exist in the epigastrium, hypochondrium, or other region, a blister may often be applied to the painful part with advantage, after the local abstraction of blood. In the second stage, however, they have been much relied on by Rush, Odier, Percival, Cheyne, Hopfengärtner, Gölis, and others; and many cases have been recorded, where great alleviation of the symptoms has followed their application to the head or nape of the neck. Several should be applied in succession, or an irritating ointment employed to keep up the derivative effect, especially in the third stage, when there has been great sopor. In young infants they should be removed in a

few hours, or when redness of the skin has been produced, as in some cases their long-continued application has been followed by fatal sloughing. Sinapisms will often answer every indication, and prevent the inconvenience blisters are liable to occasion.

Tartar emetic ointment has been found useful as a derivative, and is indicated when the disease supervenes on repelled eruptions. Moxas, setons, and issues are for the most part too slow in their effects to be much relied on in this disease. The first, however, were employed by Reynault, and the latter are useful as prophylactics. Dr. Merriman gave the Tinct. Lyttæ internally, with a view of producing strangury, and causing irritation at the neck of the bladder. He administered from five to ten minims every four hours until this effect was produced, and cured three patients by this remedy. This preparation has also been used externally as a rubefacient.

The tepid and warm semicupium and pediluvia are often beneficial when the extremities are cold, and may be used in conjunction with cold to the head. When there is much febrile excitement, and a sthenic state of the constitution, however, they are contra-indicated. Their good effects are increased by the addition of salt, mustard, and other cutaneous stimulants. The warm bath increases cerebral determination in cases where there is much excitement of the system, but when the disease is connected with a state of debility, it often tends to relieve the general irritability, especially in children. The vapour bath has been recommended by Dr. A. Hunter. M. Itard impregnates it with vinegar as a means of stimulating the surface, and producing an abundant flow of perspiration. He states, that until he introduced this practice, all the cases he treated, amounting to seventeen, perished; but that afterwards he was fortunate enough to cure two out of three infants, and in one case the child was in the last stage of the disease, without consciousness and power of motion. M. Recamier has employed the cold bath in the first stage when there is much excitement, and it is said with success. It may also be useful as a tonic during convalescence. Fomentations and frictions to the abdomen, when there is pain in that situation, are also occasionally beneficial.

Palliatives and restoratives are to be had recourse to in the latter stages of the complaint, although the disease may appear hopeless. Indeed, cases apparently at the last extremity have recovered, and this should induce the practitioner to continue his efforts to relieve distressing symptoms, and support the strength under the most adverse circumstances. Vomiting may be sometimes checked by effereescing draughts, combined with a few drops of laudanum, the application of a sinapism or turpentine liniment over the epigastrium, or by emollient clysters containing turpentine. The convulsions have often been suspended or somewhat lessened by the cold affusion or turpentine enema. If they are severe, the tobacco enema may be cautiously tried. In the last stage, when the powers are exhausted, gentle stimulants and nourishing broths should be given to support the strength; and the preparations of ammonia, camphor, and valerian, combined with bitter infusions, may be at the same time administered.

The *diet* must have reference to the constitutional powers. If, as is generally the case, the disease occurs in a sthenic state of the system, an antiphlogistic regimen, consisting chiefly of diluents, should be enforced during the early stages. When the vital powers however are feeble, or the disease depends on exhaustion, a nourishing diet should be allowed: in infants the milk of a healthy nurse or asses' milk is necessary. In the collapse of the last stage of the disease the nutriment should consist of beef-tea, warm jellies, &c. &c. The convalescence should be carefully watched, and the patient removed to a pure dry air as early as the strength will permit.

The remedies we have noticed are the most powerful means we possess for subduing acute hydrocephalus, depending on active congestion or inflammation of the membranes or substance of the brain. We have remarked, however, that acute hydrocephalus is occasionally connected with an opposite state of

the system, or one of exhaustion and debility: under such circumstances the circulation within the cranium is to be restored to its natural state, and subsequent effusion prevented by invigorating the general powers. Several writers have noticed the identity of the cerebral symptoms so produced with those of hydrocephalus, and have thought that the differences in the constitutional phenomena, and the means necessary to relieve them, to be sufficient reasons for treating this affection as a distinct disease, and for giving it a new appellation (hydrocephaloid disease). We have, however, already stated our reasons for considering it to be only a variety of hydrocephalus, and shall now describe the plan of treating it. If it occur in very young children, the milk of a strong and healthy nurse is essential, and if the diarrhœa which sometimes precedes the disorder continue, it will be necessary to check it by mild astringents, such as preparations of chalk or catechu. Small doses of sal volatile or brandy should be at the same time administered. When the diarrhœa has ceased, the bowels are to be regulated, if necessary, by small doses of Hyd. c. Cretâ, magnesia, or castor oil. If there be much irritability, the warm bath will be useful; and, should coma supervene, blisters or sinapisms should be applied to the nape of the neck. The extremities should be kept warm by flannels, and the erect posture avoided. The treatment of these cases in adults and in old persons is described under the head of APOPLEXY.

APOPLEXY.

Definition.—*Premonitory symptoms.*—*Of the different forms.*—*Transient or fugitive.*—*Sudden or primary.*—*Ingravescent.*—*Paraplexy.*—*Anatomical characters.*—*Connection of symptoms with morbid appearances.*—*Pathology, or theory, of apoplexy.*—*Causes.*—*Predisposing.*—*Exciting.*—*Diagnosis.*—*Prognosis.*—*Treatment.*

By the term apoplexy (derived from ἀποπλῆσσω, *percutio*) is understood a sudden loss of consciousness and volition, the circulation and respiration being more or less disturbed. In this sense it has been usually employed by physicians from the days of Hippocrates to the present time. This definition, however, does not distinguish apoplexy from syncope, concussion of the brain, fracture of the cranium with depression, or indeed from any other disease in which there is coma; and, as we shall have occasion to point out hereafter, there may be sometimes much difficulty in separating it from these affections. The French writers have endeavoured to avoid this confusion, by limiting the meaning of the word apoplexy to the occurrence of spontaneous hæmorrhage in an organ; and hence the terms apoplexy of the spinal cord, of the lungs, liver, heart, muscles, &c. They are, however, under the necessity of acknowledging, that it is often difficult to discover in the living body, whether any extravasation of blood has taken place, and consequently a person may be labouring under all the symptoms of apoplexy, as it has been described from the most ancient times, and if after death no effusion of blood is discovered within the cranium, we must not apply the term apoplexy to this disease. Some cases also have occurred, where slight cerebral hæmorrhage has taken place, and the ordinary symptoms of apoplexy have been wanting: under such circumstances we must admit that the patient has been labouring under the disease, although none of its symptoms have been present. In the absence, therefore, of any certain signs which indicate the lesion which causes apoplexy, we consider that the French pathologists have been premature in endeavouring to change the meaning of a word so generally employed. Even were their ideas correct, it would be better to designate the lesion by its proper

name, such as hæmorrhage within the cranium, than introduce increased confusion by changing the signification of a word which has been used in medicine for a series of ages.

Hippocrates divided apoplexy into the *strong* and the *weak*; Galen into four varieties, according to the effect produced on the respiration. Most authors consider, that though there is great diversity in the severity of apoplectic seizures, the terms which have been invented to indicate the force of the attack, as *weak*, *strong*, or *intense* (*debilis*, *fortis*, *fortissima*), are only comparative, and do not convey precise notions to the mind. Cullen distinguishes nine species of apoplexy, the *sanguinea*, *serosa*, *hydrocephalica*, *traumatica*, *venenata*, *mentalis*, *cataleptica*, and *suffocata*. This arrangement from the causes bears, however, no relation to the symptoms, or morbid anatomy, and has consequently been rejected by subsequent writers. The terms *sanguine* and *serous*, from the nature of the effusion found after death, have been retained by many, and some have adopted the terms *nervous* and *bilious*, as giving some idea of the origin of the disease. We shall have occasion to show, however, that neither of these latter distinctions are founded in an extensive knowledge of its pathology. With reference to the state of the vital powers, several authors speak of *atonic* or *entonic*, *active* or *passive*, *sthenic* or *asthenic* apoplexy—terms which convey no idea of its nature, although, as indicating opposite states of the system in this disorder, they are founded on truth, and are therefore useful with a view to treatment. Other distinctions have arisen from the prominent symptoms; thus, Burserius, Zulianus, Sydenham, Hoffmann, Tissot, and others, speak of *convulsive*, *hysteric*, and *paralytic* apoplexy. When no morbid appearance can be detected after death, the term *nervous* has been applied to it by numerous writers, *simple* by Abercrombie, and M. Gendrin treats of it under the name of *coup de sang*. The two last terms, however, have been differently applied by other authors, who understand, by simple apoplexy, that the attack is unconnected with any complication; and, by *coup de sang*, a sudden seizure dependent on congestion of the cerebral vessels. Apoplexy complicated with paralysis, has been distinguished by the word *paraplexy*. Galen and Boerhaave employed this term, which has been lately adopted by M. Gendrin.

Symptoms. It is very rare that an attack of apoplexy takes place without certain premonitory signs, although in some cases they are too slight or rapid to be noticed. The following are those which have been most commonly observed:—drowsiness with sense of weight in the head; vertigo, especially on leaning forwards; noises in the ears; some defect in the sense of hearing and of smell; more or less imperfect vision; optical illusions; difficulty in reading and distinguishing small objects; numbness of the extremities; itching or formication; pain in the temples or behind the ears, particularly after eating or remaining some time in places of a high temperature. Sometimes there is loss of memory, forgetfulness of words, or the substitution of one word for another; incoherent talking; inability to write, and difficulty of spelling words; spasmodic movements of one or more of the extremities, of the eyelids, or of the muscles of the face; more or less rigidity or contraction of the limbs; fatigue after gentle exercise; unsteadiness in walking; flushing or unnatural paleness of the countenance; turgidity of the veins of the head; hæmorrhage from the nose; yawning; vomiting, &c.

These symptoms are not peculiar to apoplexy, many of them being also the precursors of acute diseases, of chronic lesions of the brain, or of diseases occasioned by affections of the heart or stomach. As, however, they always indicate a disorder in which the functions of the brain are more or less disturbed, they are not to be overlooked. One or more of these may be present and disappear several times before the apoplectic attack, and occasionally they undergo several changes, some being replaced by others. The duration of these premonitory signs is also variable: many months may intervene after their first appearance; while, on the other hand, they may come on only a few minutes before the attack. None are to be relied on more than others, as pointing out with

certainly the nature, intensity, or form, of the attack. The order of their appearance is also very various. In several instances the most severe forms of apoplexy have resulted, when the premonitory symptoms have been so unimportant as almost to have escaped attention; while in others a comparatively slight attack has followed well-marked precursory signs. Notwithstanding the difficulty these circumstances occasion, the practitioner, if called in at a sufficiently early period, should take much pains in investigating the above symptoms, as, by connecting them with the age, habits, and condition of the patient, he may be led to predict the approaching disease, and, if not able to prevent, may at least be prepared to lessen its effects.

The symptoms which characterise the attack may assume different forms:—

1. *Transient or Fugitive Apoplexy.* In this, the slighter form of the disease, the symptoms generally commence with vertigo and sensation of feebleness; occasionally with retching or vomiting. The patient shortly after becomes unconscious, and falls to the ground, appearing as if in a profound sleep; the limbs when lifted fall like inert bodies, and the different senses are more or less insensible to the application of their appropriate stimuli; the pulse is strong, not frequent, sometimes bounding; the face is generally injected, and occasionally appears to be swollen; the eyes are immovable, the conjunctiva injected, and the lips livid; the carotid and temporal arteries beat with much force; the respiration is free, deep, and regular. The heat of the skin is generally increased over the head and face, while it is diminished on the other parts of the body. Sometimes, at the commencement of the attack, the face becomes suddenly pale and afterwards injected, while the temples are covered with perspiration: in other cases the paleness alternates with flushing.

The symptoms in this form of apoplexy have various degrees of intensity, and continue for a shorter or longer time. Sometimes the patient is affected with giddiness, feels his legs totter, and loses consciousness only for a few minutes. In general, however, the duration is about two or three hours, and more rarely the apoplectic symptoms continue ten or twelve hours. Immediately on recovering from the attack, the patient expresses astonishment, feels difficulty in expressing his ideas, and cannot articulate distinctly. These effects soon pass off, but there remain generally for two or three days a sense of pain and heaviness in the head, dulness of the mental faculties, dislike to all kinds of exercise, and drowsiness. This form of apoplexy is seldom fatal, but has a strong tendency to return, so that a patient may, perhaps, have three or four attacks annually. If frequent, however, they gradually affect the functions of the brain, producing great feebleness of the intellectual faculties, loss of memory, imperfect muscular motion, trembling of the limbs, and dulness of sensibility. M. Gendrin relates the case of a man, who during a period of seven years had twenty-three apoplectic attacks, which gradually affected his intellect; he died, almost fatuous, of cancer of the stomach. No lesion could be found in the brain or spinal cord. (*Traité Philosophique de Médecine Pratique*, 1838.)

Hoffmann and other authors speak of intermittent apoplexy, which may be classed with the cases now under consideration. M. Bailly has noticed it in conjunction with the intermittent fevers of Rome. (*Traité Anatomico-Pathologique des Fièvres Intermittentes, Simples et Pernicieuses.*) Andral gives a remarkable case of it cured by quinine, and another where after death the spleen was found enlarged. (*Clin. Méd.*) The occurrence of vertigo also sometimes accompanied by loss of consciousness, is not uncommon in some persons at certain periods of the year, as at the commencement or termination of the autumn and winter. To this form of apoplexy belong, in our opinion, those cases which M. Foville speaks of as constituting a mild species of epilepsy, characterised by loss of consciousness, general insensibility, relaxation of the muscles, and vacillation or falling of the trunk. (*Dict. de Méd. et Chir. Prat.*) There is undoubtedly much analogy between this form of apoplexy and epilepsy, as shown by its tendency to recur and the gradual loss of intelligence: but the distinguishing feature of the latter disease, viz. convulsions, is rarely

present. M. Lallemand has pointed out that it is often symptomatic of long-continued seminal emissions, and that the urgency of the cerebral symptoms often causes the original malady to be overlooked. (*Des Pertes Sémiales Involontaires.*)

2. *Sudden or Primary Apoplexy.* In the second form the patient falls down suddenly, deprived of consciousness and voluntary motion; the face is generally flushed; the breathing slow, deep, and stertorous; and the pulse usually full, not frequent, or below the natural standard, but occasionally small and weak. Sometimes there is convulsion, or rigidity of the muscles of the extremities; in a few cases there is contraction of the muscles of one side with relaxation of those on the other. Occasionally the attack commences or is accompanied with general convulsions passing into profound coma. In this state the patient may die after an interval varying from a few minutes (*Abercrombie*) to several days, generally from the first to the fourth day; or a gradual and complete recovery may take place. It is rare, however, that a patient recovers after being perfectly comatose for more than two days.

3. *Ingravescent Apoplexy.* The third form commences with sudden and violent headach, and occasionally momentary loss of consciousness and voluntary motion, from which the patient quickly recovers. The face is pale, there is often a feeling of sickness and faintness, and frequently the patient falls down in a state resembling syncope: sometimes there is a slight convulsion. These symptoms, either wholly or in part, soon subside, consciousness returns, and the patient is able to walk about. The headach however continues, and is often referred to one side, while the vomiting recurs. The pulse becomes gradually weak and frequent, the countenance pale and sunk, and the patient feels depressed. After the continuance of this state for a period varying from a few hours to several days, the face becomes flushed, the pulse more strong, and the heat of the skin increased; the patient more and more oppressed, forgetful, and incoherent; slight and afterwards profound coma succeed, and death closes the scene. The cases recorded by *Abercrombie* show that these changes may occur in fifteen or twenty minutes, or an interval of a fortnight may occur between the first seizure and the more urgent symptoms. (*Pathological and Practical Researches on Diseases of the Brain.*)

4. *Paraplexia, or Apoplexy complicated with Paralysis.* In the fourth variety a greater or less degree of paralysis, generally hemiplegia, is the characteristic symptom, and this may appear before, during, or after the attack. The first symptom which occurs may be sudden loss of power on one side of the body, with loss of speech, while the consciousness remains perfect, or, if lost, it may return. In this situation the patient attempts to express himself by signs. Instead of hemiplegia, the paralysis may be confined to the muscles on one side of the tongue, which deviates to the right or left when it is thrust out of the mouth. In some cases the motor power may be enfeebled, and limited to certain parts, as the hand, fore-arm, the foot, &c. In others there is insensibility of a part of the integuments joined to paralysis, more or less complete, of the arm, hand, leg, or one side of the face: there may be also inability to move the eye or eyelids. Either of these states may pass into apoplexy. When paralysis accompanies or follows the apoplectic attack, the latter may commence with one or more of the premonitory symptoms, which may be of longer or shorter continuance. During the seizure the mouth is often distorted on one side, the limbs are motionless and insensible, while those on the other are contracted or slightly convulsed on the application of stimuli. As the apoplexy declines, the paralytic symptoms become more prominent, and paralysis of the orbicularis, distortion of the eyes, twisting of the mouth, palsy of a particular set of muscles or of one or more limbs, of half the trunk or of the face, &c. may remain. At other times there is loss of sensibility in these parts, while the power of motion is perfect, or only enfeebled. In general the speech is either lost or greatly impaired; and the patient, perfectly conscious, attempts to express himself by signs, though very often he is incoherent, un-

intelligible, and without recollection. The various symptoms now described may disappear in a few hours, and the patient perfectly recover. Sometimes the amendment is gradual, the paralysis not disappearing for several weeks or months; in other cases there is partial recovery only, which afterwards undergoes no further amendment, and the patient may continue in this state for an indefinite period, and at length die of another disease or of a new attack. In some instances no amendment takes place after the invasion of the symptoms—he remains speechless and paralytic, confined to his room, in possession of his other faculties, and after many weeks or even months sinks exhausted, coma having occasionally supervened a short time before death.

The different forms of apoplexy we have now described not unfrequently pass into each other. Thus it may happen, that after one or more attacks of the first form (fugitive apoplexy), the second, third, or fourth variety may supervene, and many of the symptoms characterising these last may in particular instances be found united. Numerous varieties also occur in individual cases, which differ according to a variety of circumstances, but minute inquiry into the particular symptoms of the case will generally enable the practitioner to attribute the disorder to one or other of the above forms.

Besides considering the various symptoms constituting the disease in the aggregate, it is necessary, with a view to a correct and efficient treatment, to pay particular attention to each individually. The character of the *pulse* is very variable in apoplexy. It may be strong without frequency; or soft, as in the first or second forms; or it may be firm and irregular, as in the third variety and last stages of the fourth. At the commencement of an attack it may be slow and full, and towards the end become feeble and irregular. The character of the pulse, as we shall afterwards have occasion to observe, is important as a guide in the treatment, and often proves a valuable diagnostic. The *respiration* also is variable; it is often stertorous, although sometimes perfectly free even in extreme cases: experience has proved, in opposition to the opinion of some writers, that in itself it furnishes no indication of the danger of the patient. The colour of the countenance is equally uncertain. Flushing or paleness of the countenance has been supposed to distinguish the sanguineous from the nervous and serous forms of apoplexy. The diagnosis founded on the one condition of the countenance or the other is extremely fallacious, as no constant relation exists between them. The *expression of the countenance*, as indicating stupor and loss of the mental faculties, is usually well-marked. The *pupils* are generally immovable, especially in violent attacks and towards the latter stages; in some cases, however, the iris retains more or less of its contractility. The excretions are occasionally discharged involuntarily; this generally happens as the disease approaches its fatal termination. *Rigidity and contraction of the limbs* are often present to a greater or less extent, and come on gradually or suddenly, before, during, and after the attack. We have seen the rigid contraction of one or both limbs on the same side of the body, which had appeared simultaneously with the seizure, diminish in a few hours, and appear suddenly in the opposite, although the apoplectic symptoms had undergone no change. *Convulsions* are sometimes observed, especially in the third and fourth forms; in the latter they are usually on the side not paralysed. They may be general, or confined to one limb or one side of the body. Occasionally they occur on the same side, and alternate with the paralysis; and sometimes there is tetanic rigidity in the same parts. *Loss of consciousness*, more or less transient, has been generally supposed to be invariable. M. Rochoux however states, that he has seen a number of cases in which consciousness was partially retained during the attack, although an effusion of blood had taken place in the brain. (*Dict. de Méd. et Chir. Prat. art. APOPLEXIE.*) *Sensibility* is often destroyed, so that pricking or pinching apparently produces no impression. When consciousness is entirely destroyed, however, the application of stimuli to the limbs often causes slight contractions. *Paralysis of motion* may affect the muscles of the eye, the orbicularis, those of

the larynx, tongue, œsophagus, face, neck, arm, leg, or side of the trunk. The muscles of the superior and inferior extremities are most commonly affected, particularly the former; next in frequency are those of the tongue and face, then the neck, and more rarely the larynx and œsophagus.

Anatomical characters. The appearance found on the dissection of individuals who have died of apoplexy are very various; a fact which has given rise to much speculation regarding the true cause of the disease. Five distinct states of the brain have been found after death:—1. The brain has in every respect presented a healthy appearance, the most rigorous and careful examination having failed to discover any morbid change. 2. The vessels of the substance of the brain, or the membranes covering its surface or lining the ventricles, have been found more or less injected with blood. 3. Serous effusion, more or less considerable in the cavity of the arachnoid, and in the ventricles of the brain. 4. Extravasation of blood has been discovered either between the membranes, or into different parts of the substance of the brain. 5. A portion of the brain may have undergone the alteration known by the name of *softening*, or *ramolissement*. The four last appearances may be found co-existing. We shall describe each of these lesions in succession:—

1. *No appreciable lesion in Fatal Apoplexy.* That fatal cases of apoplexy may occur, and leave no appreciable lesion, is a fact now acknowledged by all writers on this disease. Many instances have been recorded by the older authors, as Morgagni, Tissot, Quarin, and Stoll; but, until lately, such instances were attributed to want of care during the examination. The cases, however, which have been detailed by Abercrombie, Bright, Cooke, Wilson, Louis, Gendrin, and others, have shown that this can no longer be a matter of dispute. Hildenbrand noticed, that after the apoplectic state of contagious typhus, no morbid appearances could be discovered in the brain. The same symptoms, moreover, are known to result from concussion of the brain, death by lightning, extreme cold, and from narcotic poisons, without necessarily occasioning any appreciable lesion. To apoplexy, in which no morbid alteration can be discovered after death, different names have been given. Burserius termed it *convulsive*; Hildenbrand and others, *nervous*; Tissot, *hysteric*; Abercrombie, *simple*; and M. Gendrin treats of it under the name of *coup de sang*.

2. *Injection of the bloodvessels of the brain or its membranes* is often observed, especially combined with the two lesions next to be described. Occasionally, however, it is the only alteration that can be observed, in which case it constitutes a mild form of what has been denominated *sanguineous apoplexy*. It has been observed in rapidly fatal cases of *coup de soleil*. Injection of the cerebral vessels, extremely well-marked and occasioning apoplexy, has been remarked by Andral in persons labouring under phthisis, and in a female affected with cancer of the uterus, who was much exhausted in consequence of the frequent hæmorrhages from that organ, proving that it is compatible with the anæmic condition. Injection of the membranes of the brain is so common in new-born infants, that Billard considered it as a natural rather than morbid state. This vascular injection may be partial or general; it may be confined to a small spot, or more or less extended over the organ: indeed, every portion of the cerebral substance is liable to this alteration. It is not unfrequently seen surrounding the remains of old coagula.

3. *Effusion of serum* is not unfrequently found after death from apoplexy. The effused fluid is sometimes limpid, or it is turgid, and of a yellow or reddish colour. The presence of serum within the cavity of the arachnoid, or in the ventricles, is to be attributed to obstruction of the blood, and transudation of the more fluid parts through their coats; and hence the origin of the serum in these cases is the same as in other dropsies. It is seldom found without engorgement of the veins and sinuses of the brain, and may take place immediately before or even after death. When the effusion of serum is the chief morbid lesion after fatal cases of apoplexy, it constitutes hyperacute hydrocephalus—the *serous apoplexy* of some writers.

4. *Extravasation of blood* is by far the most common morbid lesion found in persons who have died of apoplexy, and constitutes the true *sanguineous* apoplexy of authors. The extravasation, which varies in quantity from a few drops to six or seven ounces, may occur between the membranes, in the ventricles, or in the substance of the brain. Dr. Watts has recorded a case cited by Abercrombie, in which, from caries of the left parietal bone destroying a vessel, extravasation of blood took place between the bone and dura mater. The patient was immediately affected with hemiplegia of the right side, and died in five days.

Effusion of blood may also take place in the cavity of the arachnoid, forming the *meningeal* apoplexy of M. Serres. In this case it may be diffused over the whole surface of the brain, confined to one hemisphere, or to a small portion of it. The researches made by M. Cruveilhier at La Maternité have shown that apoplexy, connected with this lesion, is the cause of death in one third of the infants who die shortly after birth. Extravasation of blood into the cavity of the arachnoid is the morbid appearance generally found in these cases; in most instances it is limited to the circumference of the cerebellum, but sometimes covers the cerebral lobes: it rarely occurs in the ventricles, and M. Cruveilhier has never seen it in the substance of the brain or cerebellum. He has observed it in almost all the cases which have been usually considered to be asphyxia, and attributes its production to mechanical causes arising from difficult parturition. (*Anat. Pathol. du Corps Humain*, liv. xv.)

Blood may be extravasated into the lateral, third, and fourth ventricles: it may be found in one cavity only, or in all of them: sometimes the effusion extends into the cavity of the arachnoid, or into the spinal cord. Most frequently the hæmorrhage takes place into the substance of the brain, and this may occur in almost every portion of its substance—towards the circumference, near the centre, or at the base. It is most common near the corpora striata and optic thalami, and next in the hemispheres. Of 392 cases of cerebral hæmorrhage collected by Andral, 202 occupied at the same time the corpora striata and optic thalami; 61 the corpora striata; 35 the optic thalami; 27 the portion of the hemispheres above the centrum ovale of Vieussens; 16 the lateral lobes of the cerebellum; 10 an anterior lobe of the brain; 9 the tuber annulare; 8 the spinal marrow; 7 a posterior lobe of the brain; 5 the middle lobe of the cerebellum; 3 the cerebral peduncles; 1 the peduncles of the cerebellum; 1 the olivary body; and 1 the pituitary gland. (*Anat. Pathol.* tom. ii. p. 758.) The hæmorrhage may take place from the minute capillaries, or from the larger trunks; in the latter case the symptoms are more severe. Over-distension from any of the exciting causes to be presently mentioned may give rise to cerebral hæmorrhage; but sometimes it can be traced to disease of the vessels themselves, as noticed by Morgagni, Lieutaud, Baillie, and other later writers. Bouillard has seen chronic inflammation of the vessels; Morgagni, Mills, and Serres, have found them ulcerated; Blane, Hodgson, Serres, Bright, and others, have traced the extravasation to the rupture of small aneurisms; and in old persons it may be caused by their rigidity, or by calcareous deposits in their structure. When the hæmorrhage is in the cavity of the arachnoid, it arises from some of the meningeal vessels; when in the lateral ventricles, Morgagni, De Haen, and Hufeland, have traced it to the choroid plexus; and when at the base of the brain, the retiform plexus, or the trunk and branches of the basilar and carotid arteries, may furnish it. Sometimes the blood is infiltrated into the substance of the brain, the texture being softened; in other instances it forms circumscribed collections and cavities in the cerebral mass.

If the patient survive the immediate effects of the cerebral hæmorrhage, certain changes take place in the extravasated blood: these changes indicate the length of time such effusions have existed previous to death. If the patient have survived from fourteen to twenty days after the extravasation, it has been observed that the fluid parts of the blood have disappeared, and the

coagulum has become more firm, and of a dark brownish colour. After this it gets more solid, of a fibrous texture, and the red colour is gradually lost. In general, at the end of four or five months, all the coagulum has disappeared, and nothing remains but a loose cellular-looking mass of a light reddish colour. This process is longer or shorter, according to the size of the coagulum, and the constitution of the individual. Moulin found a small portion of the coagulum at the end of a year; Riobé observed some blood in a cavity after twenty months, and in two cases found a hard coagulum—the one at the end of two, and the other of three years. The texture in the immediate vicinity of the effused blood also undergoes changes. A yellowish membrane forms, which remains when the coagulum has entirely disappeared, and is often observed to be organised, and to possess numerous bloodvessels. It forms a well-defined cavity, which is either empty, or crossed by bands of the same substance which composes it, uniting the opposite sides. Cruveilhier, Bright, and others, have in some instances seen it reduced to a dense nucleus, and in others to a linear induration resembling a cicatrix. Dr. Abercrombie, however, states that he has examined such cysts at various periods of their progress, but has seen nothing like an approach to obliteration. Various opinions have been formed as to the formation of this cyst. M. Gendrin thinks that it precedes and is necessary to the absorption. Andral and other French writers state that they have found the cyst full of serum; and M. Rochoux has seen one with the internal surface almost as smooth as that of the ventricles, and moistened by a slight serosity. These facts favour the theory of M. Riobé, that the coagulum is absorbed by the exhalation of a serous fluid from the surrounding membrane, which dissolves a portion of the coagulum, and favours its absorption. A portion of the blood may also be absorbed when it is effused between the membranes, or into the ventricles, but its complete disappearance, under such circumstances, is exceedingly rare. In this case no perfect cyst is formed, but the arachnoid membrane becomes thickened, of a yellowish colour, and appears to perform its absorbent function. These cysts or cicatrizations are always of the same number as the previous attacks. M. Moulin and Dr. Abercrombie have each found four in one individual, and M. Cruveilhier has seen five. These instances, however, are very rare. M. Lallemand says he has seen forty cysts, the remains of extravasations, in one individual: there must, however, be some error connected with this observation.

Softening. Dan de la Vauterie, Rochoux, Andral, Lallemand, and others, have recorded many cases of apoplexy connected solely with softening of the brain. This lesion presents different appearances. Sometimes it is not distinguished by any change of colour; in other cases the part affected may be more pale than natural, and of a dull or bright white. Occasionally the softened part is of a rosy colour, more or less intense, arising from increased vascularity, or it may be of a greyish or yellow greenish aspect. When it surrounds an extravasation of blood, it is generally of a dirty red or brownish colour, arising from the mixture of this fluid with the altered structure. It varies considerably as to consistence: in extreme cases the softened portion of brain is reduced to an almost fluid pulp: but there is every intermediate degree of softening, until it can scarcely be distinguished from the healthy cerebral substance. The change to softening may be sudden, the softened portion filling a cavity apparently dug out in the substance of the organ, or it may be softest in the centre, and gradually become more firm until it terminates in healthy brain. Much doubt exists regarding the origin of this alteration. By Lallemand it is supposed always to arise from acute, subacute, or chronic inflammation; and that this may occasionally produce it, is generally acknowledged. Baillie, Abercrombie, and Rostan, have found it under circumstances where no appearances of inflammation were present, particularly in old persons; and in such cases they have considered it analogous to gangrene in other structures. M. Recamier thinks the same species of softening is the result of an alteration

sui generis, occasioned by nervous, pernicious, or malignant fever; while Dr. Carswell is of opinion, that its real nature is unknown. When softening occurs around collections of blood, it is supposed by Cruveilhier, Craigie, and some other pathologists, to be the result of the extravasation; while M. Rochoux thinks that it precedes this event, and that it forms a peculiar species of ramollissement, different from that described by MM. Rostan and Lallemand, to which he has given the name of *hæmorrhagipare*. Some cases, recorded by M. Durin Fardel (*Gaz. M.d. Mai*, 1838), seem to favour this view. From the numerous facts, however, which have been published concerning this disputed question, it seems most probable that softening sometimes precedes, and sometimes follows, cerebral hæmorrhage. This lesion forms the *capillary apoplexy* of M. Cruveilhier.

Numerous other alterations have been found on the dissection of individuals who have died from apoplexy. The most important of these are the various changes which occur in the heart and lungs, as the obstruction they occasion in the circulation may produce a state of the brain highly favourable to the production of apoplexy. Thus, thickening of the pericardium, a collection of serous fluid in its cavity, and adhesion between its layers, have been occasionally found. Legallois, Bricheteau, Lallemand, Watson, and others, have shown that hypertrophy of the heart is not an unfrequent complication of apoplexy. Dr. Cheyne has published a case, in which after death the fleshy part of the heart was found converted into fat. (*Dub. Hosp. Rep.* vol. ii. p. 216.) Thickening and ossification of the aortic valves also have sometimes been observed. The lungs have been found condensed by effused fluid, more or less congested, inflamed, hepatised, or disorganised by tubercles, melanosis, calcareous concretions, &c. The bronchia have been found thickened, and their mucous linings considerably altered by chronic inflammation.

Connection of symptoms with morbid appearances. It has already been stated, that hæmorrhages may occur in almost every part of the brain, and an attempt has been made to connect particular symptoms with lesion of certain portions of the cerebral substance. Apoplexy, however, can in very few instances either confirm or nullify such physiological or pathological speculations, as the morbid changes which occasion it are seldom confined to one portion, but are either wholly or in part diffused over the organ. Hence, we need not be surprised that the theories which have been brought forward should be sometimes apparently supported or opposed by different cases. M. Bouillard has related many instances where paralysis of the tongue coincided with more or less alteration in the anterior lobes of the brain. Pinel, however, has observed paralysis of the tongue, when the anterior lobes were not the seat of any lesion; and Rochoux states that he has observed a delirious loquacity when they were affected. MM. Cruveilhier, Piorry, Sandras, and Bérard, have noticed numerous similar facts. M. Foville considered paralysis of the tongue to be connected with injury of the cornu ammonis, while Treviranus believed it to be the seat of the memory of impressions on the olfactory nerves. Many observations, however, are opposed to these opinions. MM. Serres, Foville, and Pinel Grandchamp suppose that lesions of the corpora striata are followed by paralysis of the superior extremities, and those of the thalami by palsy of the inferior. Numerous observations, however, show that this opinion is founded in error, besides that it is opposed to the majority of anatomical, physiological, and pathological facts. Neither does apoplexy furnish any proof that the grey matter is the seat of intelligence, as stated by MM. Foville, Delaye, and Pinel Grandchamp.

Extravasations into the cerebellum are generally fatal, and occasion the most formidable attacks. Flourens and Rolando have considered that this portion of the brain is connected with the power of motion; but when it is the seat of hæmorrhage, the loss of movement is more readily explained by the pressure necessarily produced on the medulla oblongata. Neither does apoplexy prove that the cerebellum, according to the views of MM. Foville and

Pinel Grandchamp, is in any way related to sensibility. M. Serres maintains with Gall and his followers, that injuries to the cerebellum cause disorder of the genital functions, particularly erections and seminal emissions in men, and sanguineous discharges from the female. Cruveilhier, Abercrombie, and other writers, have recorded cases in which no such symptoms occurred, although the cerebellum was the seat of large apoplectic effusions; and it is well known that they often result from lesions of the spinal cord, when no morbid lesion is found in the cerebellum. The tuber annulare is occasionally the seat of extravasation, notwithstanding its density; and in such cases general paralysis, soon involving the muscles of respiration, and quickly followed by death, is usually the result. But if the lesion is of small extent, paralysis on the opposite side sometimes follows, which is invariably permanent if the nervous fibres are torn across. In such cases cysts form in this as in other portions of the brain.

With regard to the morbid changes more immediately connected with the different forms of the invasion, it generally results that the more sudden the extravasation, and the larger the quantity of blood effused, the more abrupt and severe is the attack; and, should the patient recover from it, the more serious are the effects. When the blood occupies the base of the cranium, influencing more especially the superior portion of the spinal cord, such as the medulla oblongata, annular protuberance, optic thalami, and corpora striata, sudden death, or more or less complete paralysis, is the result; and hence these parts are usually affected in the fourth variety. In the third form we most commonly find softening in the brain near the extravasations of blood, the cerebral substance being discoloured and broken down, indicating that in these cases this change had either preceded the attack or followed shortly on the effusion. Occasionally it is apparent that a recurrence of the hæmorrhage had produced a lacerated opening, communicating either with the ventricles or the exterior surface of the brain. The symptoms we have enumerated—first, the pain in the head, and sudden loss of consciousness; secondly, the recovery; and, thirdly, the fatal coma—are apparently connected with these changes. In the second form we find effusion of serum or of blood. The former results from congestion of the vessels, which is more or less common to all the forms of apoplexy. It is the only change which exists in the first form, as the attack comes on suddenly, often passes away, and returns at indefinite, or in some cases at regular, periods.

Pathology, or Theory, of Apoplexy. We now proceed to inquire into the condition of the brain on which apoplexy strictly depends. We have seen that loss of consciousness, sensation, and voluntary motion, is the chief characteristic of the apoplectic state. We have also seen, that although by far the most common lesion found after death is extravasation of blood within the cranium, this is not necessary to produce the malady, as occasionally only turgescence of the vessels, serous effusion or softening, can be discovered, while in some instances no morbid appearances whatever can be detected. In many of these latter cases the symptoms are the same as in the former; and, in the living state, it is often impossible to tell whether any, or which, of these morbid appearances may be found after death. Apoplexy therefore, though it may be induced, is not necessarily dependent on any one of the morbid lesions described, but on some cause which is common to all its forms, and to all the post mortem appearances which have been found in connection with it. In the preliminary observations we have already attributed it to pressure, and we entirely agree with Dr. Clutterbuck, in considering that this pressure acts on the bloodvessels, producing interrupted circulation within the cranium. (*Cyc. Prac. Med.* art. CEREBRAL APOPLEXY.) It must be remembered, however, that sufficient pressure on the brain will always cause interrupted circulation, and the latter will always occasion the former; so that, in point of fact, these two expressions, so far as the explanation of apoplexy is concerned, are almost synonymous. If fracture of the cranium with depression of bone occur, coma and perfect apo-

plexy is produced; and, on elevating the depressed bone, consciousness and the other mental faculties in many cases immediately return. Hence pressure has evidently been applied to the brain, causing loss of its functions, and on removing it they are restored. In the same way, if a bloodvessel is ruptured in the head, blood is poured into the ventricles, or into the substance of the brain, and the same symptoms are occasioned. Here surely we are also warranted in attributing the apoplexy to the pressure produced. If the blood is poured from a large vessel, or quickly from a small one, the effect will be sudden; but a little reflection will show the possibility of the extravasation taking place very slowly, and in such a manner, that the numerous tubes which everywhere traverse the brain may be partially compressed, and prevent any pressure on the nervous mass. At other times a small effusion of blood may take place, then cease, and occur at intervals; and in all cases, if it be sudden, pressure will be occasioned, and apoplexy produced more rapidly. But if the hæmorrhage be circumscribed, the vessels surrounding it are wholly or partially compressed; and the organ accommodating itself to the foreign body, a free circulation is established, the pressure removed, and the attack disappears. Then commence those changes in the neighbourhood of the coagulum necessary for its absorption. Should the extravasation have pressed with sufficient force, either directly or indirectly, on the motor tract, or any of the nerves arising from the cranial portion of the spinal cord (which, as has been stated, commences with the corpora striata and optic thalami), paralysis will be the result. It must be obvious, however, that in an organ situated like the brain, it is impossible to define the limits of that space over which the pressure is diffused, as this will depend not only on the extent of the extravasation, but on the force with which the blood is poured out. Hence there are many cases in which no connection can be discovered, after death, between the situation or size of the coagulum and the effects produced. Should the pressure be applied in a partial manner to the motor tract, so that some portions of it are not affected, while others are wholly or slightly so, either partial paralysis or convulsions may occur. The former may be occasioned also by softening and disorganisation of the motor tract, and the latter by the irritation of the commencement of this process. Laceration of the fibres, or the presence of cysts, will readily explain the continuance of paralysis when the apoplectic attack has disappeared. When a coagulum is present, therefore, more or less pressure explains all the phenomena occasioned.

But how are we to attribute apoplexy to pressure in those cases where no morbid lesion can be discovered? When an individual who is intoxicated falls down suddenly without consciousness, we observe the pulse bounding, the countenance flushed, and the heart's action increased—circumstances which occasion distension of the arteries within the cranium, and corresponding compression of the veins. On the other hand, when a person falls down in a state of syncope, the pulse is feeble, the face pallid, and the heart's action depressed or scarcely perceptible—circumstances which indicate an accumulation of blood in the veins, and a proportionate diminution in the caliber of the arteries. In either case, owing to the peculiarities of the circulation within the cranium, pressure is exerted on the brain. Hence syncope differs from apoplexy only in the extreme feebleness of the heart's action, the cause producing loss of consciousness, sensation, and motion, being the same in both. Indeed it is sometimes difficult to distinguish these states from each other, the pulse in many cases of apoplexy being small and irregular, while a different treatment is required in such cases from those in which it is strong. Thus, either from increased or diminished action of the heart, pressure on the brain may be produced by over-distension of its vessels with arterial or venous blood. After death of course this is not to be detected; the tonic contraction of the arteries is alone sufficient to empty them of their contents, and turgidity of the veins may remain or not according to the symptoms immediately preceding death, and the position in which the body is placed.

Obstruction of the circulation may occasion effusion of serum in so great a quantity that a portion of it may be detected after death, or this may be so small as to be immediately absorbed when the circumstances which produced it have ceased. Now, in the living state, the congestion may be greater in one portion of the brain than in another; and hence may arise different symptoms in conjunction with those of apoplexy, as paralysis or convulsions, according to the situation or nature of the pressure. Such we consider to be the pathological condition of the brain in those cases where no morbid lesion can be discovered after death.

When extravasation of blood has taken place, and an apoplectic cyst has formed, the brain is more liable to a recurrence of the attack, the presence of this, as of other foreign bodies during sudden changes of the circulation, assisting in producing pressure under circumstances that ordinarily would not give rise to it. The influence of the circulation is also well-marked in certain cases where pressure has been caused primarily by extravasation of blood, and where, after the first effects have disappeared, the consciousness has been restored, evidently in consequence of the brain having accommodated itself to the injury. Dr. Abercrombie quotes a case from Dr. Barlow, where a copious extravasation of blood was found extended over the surface of the brain, its substance being healthy. In this case coma alternated with a return of consciousness and recollection several times before death, which occurred on the sixteenth day after the attack.

We have been particular in speaking of the effects of pressure in this place, because we consider it to be the chief agent in the production of all cerebral diseases. With regard to apoplexy, it must be remembered that we were unable to explain its occurrence in all cases before the researches of Dr. Kellie of Leith were made known, as before his time pathologists had very confused ideas concerning the peculiarities of the circulation within the cranium. We need not be surprised, therefore, at some of the older writers, such as Kortum, Zuliani, Schiller, Schagger, Hufeland, and others, attributing certain cases to a defective state of the nervous power, enervation, &c. vague terms which have no meaning. The nervous power is undoubtedly diminished in all cases of apoplexy; the question is, to what it may be attributed. All writers are under the necessity of allowing, that in the majority of instances pressure produces the disorder; and we have endeavoured to adduce arguments for supposing that there are no exceptions to this rule.

Predisposing causes. It is generally supposed that males are more liable to apoplexy than females, as their active life exposes them more frequently to the exciting causes. This agrees with the statistical results of M. Falret, who found, that of 2297 apoplectic cases 1670 occurred in men, and only 627 in women, (cited by Rochoux, *Arch. Gén. de Méd.* tom. ii. 1836.) No age can be said to be exempt from apoplexy. Of 69 cases of apoplexy collected and rigorously analysed by M. Rochoux, there were two between 20 and 30; ten between 30 and 40; seven between 40 and 50; thirteen between 50 and 60; twenty-four between 60 and 70; twelve between 70 and 80; and one between 80 and 90. From this it would appear that apoplexy is most frequent between the years of 50 and 80. Cases have occurred, however, at a younger age than 20, although these are very rare. Dr. Copland states he has met with the true hæmorrhagic apoplexy at 18 years. M. Andral had a case 12 years old. M. Lallemand mentions a case at 3 years, and M. Billard at 3 days. There are some doubts whether the two last were cases of apoplexy. Mr. Greenhow, however, has recorded a fatal case, from extravasation of blood over the surface of the brain, in a child two years and a half old. (*Lond. Med. and Phys. Journ.* vol. xlvii. p. 131.) We have already alluded to this affection in new-born infants. Isolated cases have been remarked in persons very old. Cheyne attended a woman with apoplexy upwards of ninety years of age.

Hereditary disposition, it must be acknowledged, is occasionally a predis-

posing cause. To no other circumstance can the succession of apoplexies, that occur among different members of the same family, be ascribed. Portal has observed this in many families; and Forestus, Wepfer, Blane, and others, have noticed the same fact. The sanguine temperament appears to be most liable to this disease. Of the 69 cases collected by M. Rochoux, 25 were of a sanguine: 21 of a sanguino-bilious: 7 of a bilious: and 16 of a lymphatico-sanguine temperament. A large head, red face, short neck, full chest, corpulent body, activity of the circulation, and general plethora, are usually considered as tending to apoplexy; but observation daily shows, that it occurs as frequently in individuals who possess a constitution the very reverse of this, and a form of body in no way remarkable.

Apoplexy has been attributed to a sedentary life, especially in plethoric individuals who live well, in whom this disease is by no means unfrequent. Want of exercise produces a languor in the venous circulation highly favourable to this affection. Studious habits have been thought to predispose to apoplexy. (*Alberti, Seiz.*) Some, however (Rochoux), think that the exercise of the mental faculties is a preservative against the disease. The poor appear to be as subject to it as the rich: but in them, as we have often had occasion to observe at the Salpêtrière in Paris, it is commonly attended with paralysis.

Extremes of heat and cold have been thought to favour apoplectic attacks. Of 134 cases, which fell under the observation of Andral, 50 occurred in December, January, and February; 36 in June, July, and August; 31 in March, April, and May; and 17 in September, October, and November. Winter, also, has been shown, from the statistical researches of M. Falret in Paris, to be most conducive to this disease. The same fact has also been observed in Holland during a period of twenty years; and at Turin, from an average of twenty-five years. (*Andral, Clin. Méd.*) Of the 69 cases of M. Rochoux, on the other hand, 16 occurred in spring; 19 in summer; 18 in autumn; and 16 in winter.

Among the other predisposing causes may be noticed an unrestrained indulgence of the passions; laborious employment, especially in the stooping posture; a too free use of wine or malt liquors; immoderate sexual indulgence; masturbation; involuntary seminal emissions; the suppression of habitual discharges; influence of other diseases, especially hypertrophy of the heart, and organic alterations in the lungs, obstructed respiration; sleeping with the head low, particularly after meals, &c.

Exciting causes. Many of the predisposing, when suddenly applied, become also the exciting causes of apoplexy. The immoderate use of wine or spirits is often followed by an attack of apoplexy. This is one of the most common exciting causes among the poor.

The narcotism produced by the various narcotics, such as opium, hyoscyamus, tobacco, stramonium, &c. much resemble an apoplectic seizure. Dr. Copland thinks it more readily produced by monkshood than any other. He mentions the case of a young man who had incautiously chewed some seeds of this plant, which occasioned partial loss of sensibility in the face, followed by complete apoplexy, from which he recovered with difficulty, and with palsy on one side.

A large number of persons are seized with this disease, either during or immediately after violent exercise, particularly if they have been unaccustomed to bodily fatigue, or if the exertion has been made while the head has been held in an unusual position. Straining at stool and the act of parturition have been known to induce it. M. Rochoux gives a case of an individual who died apoplectic in the act of copulation. Cold long continued, or suddenly applied, may occasion apoplexy. Instances of the disease were numerous in the French army during the retreat from Russia; and the narrow escape of Dr. Solander, in Terra del Fuego, is also well-known. Heat is a fruitful source of this malady. Exposure to the sun's rays causes the *coup de soleil*, which is not uncommon, particularly in Italy, where the people are obliged to take off their hats while the long religious processions pass through the streets. The heat

of crowded rooms and assemblies has often brought on attacks, and produces some of the premonitory symptoms even in individuals not liable to apoplexy.

Exciting mental emotions, such as joy, anger, grief, consternation, terror, fear, despondency, anxiety, &c. have been known to induce apoplexy. During the period of the French Revolution, this was a most fertile cause of the disease. Many other exciting causes may be added to those now specified, such as the presence of tumours, spiculæ of bone, and other organic alterations within the cranium; metastasis of other diseases, especially gout and rheumatism; sudden disappearance of the exanthemata; suppression of the menstrual fluid; healing of ulcers, and the stoppage of accustomed discharges; sleeping after meals, particularly if an unusual quantity of food or drink has been taken; violent fits of coughing or sneezing; the undue employment of the warm bath; pressure on the umbilical cord during labour; obliteration of the jugular veins by tumours or inflammation of their coats. From the many circumstances now enumerated, it will be generally easy to find some cause to which an attack of apoplexy may be attributed; and, indeed, all those which produce sudden changes of the circulation within the cranium may, in different persons, prove the exciting cause of this disease.

Diagnosis. The apoplectic state is readily recognised, and is produced, as we have shown, by pressure on the brain. To distinguish, however, the various circumstances which occasioned it is often very difficult; as, for example, when an individual falls down suddenly, and no one is acquainted with the symptoms which have preceded it. In this case the symptoms may be known to arise from intoxication from the smell of the breath, and the nature of the contents of the stomach, which may be expelled by vomiting. In general, too, the pulse is more frequent, and the breathing is not stertorous. No great reliance, however, can be placed upon the presence or absence of these last symptoms in a diagnostic point of view.

Syncope and asphyxia are recognised by such a diminution of the pulse and feebleness of respiration as seldom occurs in apoplexy. These, together with the extreme pallor of the countenance in the former, are the chief differences. Apoplexy occasioned by injuries of the head, concussion, &c. is not to be distinguished unless the circumstances under which the attack took place are made known, or the practitioner is enabled to detect some bruise or laceration of the scalp or fracture of the cranial bones, &c.

The coma following epilepsy and hysteria is only to be known by the previous history in such cases, and the symptoms which have preceded them. In the same manner, when narcotic and deleterious gases occasion apoplexy, no peculiar symptoms point out the origin of the disorder. It may be observed that coma or the apoplectic state is symptomatic in many diseases, and, when present, is only to be distinguished from genuine apoplexy by those symptoms diagnostic of the different maladies with which it may be complicated.

Attempts have been made to distinguish the various lesions which induce apoplexy by particular symptoms. In the present state of our knowledge of the pathology of the nervous system, however, the diagnostic indications laid down by some authors should be received with caution. Congestion of the cerebral bloodvessels is rarely preceded or followed by paralysis; and if after apoplexy is well established, the symptoms continue to increase, or if they gradually diminish without any paralysis being manifested, we may in general consider this morbid lesion to have occasioned the attack. Dr. Bright has pointed out the occurrence of a constant or frequently recurring pain over the occiput, often most distinctly referred to that part to which the occipital nerve or a large branch of the second cervical nerve issuing from behind the upper part of the sterno-mastoid muscle is distributed. He considers this symptom may be diagnostic of disease in the coats of the vertebral arteries, and relates a case which supports this opinion. (*Guy's Hosp. Rep.* vol. i. p. 9.) He also conjectures, that in those cases where disease of the vessels is attended with unusual symptoms of lethargy, and the superficial pain in the occiput is

less observable, the disease probably has been situated chiefly in the internal carotids and their branches. The views of this distinguished physician, although they are not supported by a sufficient number of facts, are worthy of attentive consideration, in order that they may be tested by further observation.

Many of the older writers have endeavoured to draw a distinction between the apoplexy connected with effusion of serum and that produced by other lesions, and have considered as indications of the former its slow progress with vomiting, paleness of the countenance, general discoloration of the surface, cachectic aspect of the individual, slow pulse, &c. Portal, Wepfer, and numerous later observers, have shown that these symptoms cannot be considered as diagnostic of the presence of serum. But when the malady proceeds so slowly as to enable us to observe the symptoms, we may usually predict the presence of this fluid by the gradual loss of the special senses, particularly that of sight; feebleness of the mental faculties, and great disposition to sleep; while, at the same time, there is not much disturbance of the general circulation or respiration, and no paralysis. Softening is indicated by a continued pain in the head remaining after the first slight seizure, described under the third form of the disease, with partial loss of intelligence, difficulty of speaking, distortion of the mouth, more or less loss of sensibility or motion, and sudden rigid contraction of the arm or leg. This last symptom, on which much stress has been laid, cannot be considered alone diagnostic of this lesion, and we have often seen the most experienced French physicians deceived, even when all those above mentioned have been well-marked. In the fourth form of apoplexy, if paralysis precede the attack, it may depend either upon softening or the extravasation of blood. Partial paralysis, occurring suddenly, is one of the most certain signs of hæmorrhage in the cerebral hemisphere opposite the side affected. If loss of sensibility or motion exist during the attack, it may depend upon any of the morbid lesions which occasion apoplexy. But if it remain after the attack has disappeared, it is usually caused by a coagulum pressing, directly or indirectly, on the motor and sensitive columns. Many facts and much observation, however, are required before we shall be enabled to distinguish with accuracy in the living subject the precise morbid lesion; for although the above symptoms are undoubtedly often useful in indicating the immediate cause of the apoplectic seizure, the exceptions are sufficiently numerous to render the greatest caution necessary in endeavouring to determine its nature.

Prognosis. Apoplexy must always be looked upon as a most dangerous disease. Death may take place almost immediately or at different periods after the seizure. Occasionally, however, persons have perfectly recovered, and even ultimately died of other diseases.

The unfavourable symptoms are laborious, irregular, or stertorous breathing; difficulty or complete loss of the power of deglutition; intermittent, irregular, or frequent pulse; coldness of the extremities; cold, clammy, or profuse perspiration on the face or temples; immovable pupil; foaming at the mouth; continuance of perfect coma more than twenty-four hours, especially if judicious treatment has been employed; involuntary discharges of the urine or fæces; frequent yawning supervening delirium; general paralysis; frequent attacks of vomiting, &c.

The favourable symptoms are, free and natural respiration; easy deglutition; regularity and softness of the pulse; general and moderate perspiration over the body; quick return of the mental faculties after proper treatment; free and conscious alvine and urinary discharges; epistaxis; and the return of any accustomed discharges which may have been suppressed, as the hæmorrhoidal, menstrual, &c.

Generally speaking, a first attack is less fatal than a second or third, especially in middle-aged or young individuals, whereas, in old persons, the prognosis is more unfavourable. In giving an opinion, however, as to the pro-

bility of perfect recovery, even when the attack has disappeared, it is necessary to be very guarded, as a relapse is always to be dreaded, particularly before the tenth day.

Treatment. When we consider the various lesions connected with apoplexy, together with the different states of the system which accompany them, we need not feel surprised that many, and even opposite, methods of treatment have occasionally been successful. Experience has now proved that no exclusive plan of treatment ought to be followed, inasmuch as some cases admit of depleting, and others of stimulating, measures. But it is often difficult to distinguish the former from the latter; and under such circumstances, our knowledge of the pathology of this malady, together with the connection between the symptoms and lesions, will occasionally furnish most valuable indications. We have seen that pressure on the brain is the cause of all the forms of apoplexy, and that it may be produced by hæmorrhage or by congestion of blood-vessels within the cranium. This latter, indeed, is almost invariably present, as to it must in general be attributed the changes which immediately precede the attack. But we have also seen that congestion may occur in opposite states of the system; there may be increased or diminished vital powers, and consequently opposite measures may be necessary in its treatment. The indications in the treatment of apoplexy are, 1. To prevent the attack by arresting the premonitory symptoms; 2. To remove the apoplectic seizure when it has come on; and, 3. To obviate its effects, and prevent its recurrence.

It is of the utmost importance that the earliest indications of the premonitory symptoms should be promptly arrested, since many of the more serious organic changes which have been described may be prevented, if an energetic plan of treatment be at once adopted. If the symptoms be not urgent, brisk purging, and restricted diet, will often remove the premonitory symptoms, especially in persons of feeble powers and languid circulation. If, however, the pulse be full and strong, or the countenance flushed, and the eyes prominent or suffused, *bloodletting* is the chief remedy to be relied on. General bleeding is usually to be preferred; but in some cases, particularly when the patient is advanced in life, the application of leeches or cupping-glasses is to be preferred. The symptoms generally abate after a moderate bleeding, but the exhibition of a brisk purgative should follow the venesection. If, on the contrary, the pulse is weak, the countenance sunk or pale, the head cool, &c. restoratives or stimulants should be administered; at first small doses, narrowly watching their effects on the pulse. In doubtful cases, while neither the countenance or any other symptom offer any therapeutic indication, the practitioner should be contented with administering a brisk purgative, and applying cold lotions to the head. Should these remedies somewhat relieve the symptoms, and not materially diminish the force of the pulse, a small bleeding may be tried, carefully watching its effect on the pulse and general symptoms. But if this plan of treatment produces no benefit, and the pulse becomes weak, the stimulating practice must be cautiously resorted to.

Should premonitory symptoms appear shortly after a full meal, especially if much wine has been taken, an emetic should be given; as although the action of this class of remedies undoubtedly tends to produce momentary congestion of the cerebral vessels, the retention of a bulky meal in the stomach may induce more serious consequences. If, however, the pulse is full and bounding, the countenance much injected, and the general symptoms be urgent, a large bleeding should in the first instance be premised; when by these means the premonitory symptoms have been removed, it will be necessary to avoid strictly the predisposing and exciting causes, to regulate carefully the diet, which should consist of the most digestible matters. The state of the secretions should also be duly attended to, and a system of moral and regiminal management rigorously pursued.

If the individual have had periodical discharges of blood from the hæmor-

rhoidal vessels, an occasional application of leeches to the anus will be advisable, in conjunction with the other measures.

Treatment of the Apoplectic Seizure. Immediately the attack occurs every thing should be removed from the neck, and the individual placed in the recumbent posture, with his head and shoulders raised. If possible the patient should be removed to a large and airy apartment; if not, care should be taken that the room be of a moderate temperature. Orders should immediately be given to have hot and cold water in readiness, with basins, towels, &c. and such persons only be permitted to remain in the room as are necessary to afford assistance. The physician is then to ascertain whether consciousness has entirely disappeared; whether the sensibility of the limbs remains, by pinching and tickling the soles of the feet; and whether they are rigid, or retain their natural flaccidity, &c. He should notice the respiration, whether it is free, laborious, or stertorous; the state of the pulse, as to its fulness, strength, and regularity; the aspect of the patient should be particularly attended to, whether he appears strong, of a full habit, or weak and cachectic; the state of the eyes and pupils should be remarked; the circumstances under which the attack occurred should be ascertained, and whether there have been previous seizures. The practitioner should make himself acquainted with these particulars as soon as possible, and at once decide upon a plan of treatment.

If the pulse, especially at the temporal and carotid arteries, be full and strong, the face flushed and tumid, the respiration natural, and the eyes injected, general bloodletting is indicated. Neither advanced age, emaciation, or the disposition to any other malady, is to be considered as contra-indicating this practice. The extent, however, must be modified according to circumstances. In middle-aged, robust, and plethoric individuals, twenty, thirty, or forty ounces, may be taken at once, and repeated if the symptoms do not yield, and the pulse retain its character. Should the patient, however, be advanced in life, and of a spare habit, more caution is necessary: from ten to twenty ounces only ought, under such circumstances, to be taken. Morgagni mentions the case of a woman eighty years old, and Cooke that of another seventy-four years of age, both of whom recovered from apoplexy by bleeding. Burserius quotes from Lancisi the case of a very aged man, who was freed from impending apoplexy by the spontaneous loss of an immense quantity of blood from the nose. The same practice is to be pursued should the pulse be intermittent or irregular, so long as it retains its fulness and force, provided the irregularity or intermission does not result from disease of the heart. The utmost attention should in all cases be paid to the state of the circulation, as indicated by the pulse, because after a time the vigour of the vital actions diminishes; and although such energetic treatment is most judicious at the commencement of an attack, it is by no means to be followed in its more advanced stage. When the disease is preceded or attended by paralysis, it is possible that extravasation of blood may have taken place. In such cases a smaller bloodletting lessens the force of the pulse, and assists the practitioner in forming an opinion of the nature of the lesion. In all cases when the pulse becomes weak during the bleeding, the flow of blood should be stopped; and, should it again rise in volume, it may be allowed to flow again, watching the effect on the pulse.

Much has been written about the different situations from which blood ought to be drawn. The consideration, however, of the peculiar nature of the circulation within the cranium must render it evident, that it is only by producing an effect upon the general mass of the blood, and diminishing the action of the heart in these cases, that the pressure can be removed from the brain. The situation, therefore, from which blood can be drawn with the greatest facility is to be chosen. Bleeding from the arm is the most easy operation, and will in general answer every purpose. If, however, blood cannot readily be obtained in this way, the jugular vein or the temporal artery may be opened. Portal strongly recommends the former; and, with Burserius, Morgagni,

Valsalva, Friend, Heister, and others, directs that no ligature should be employed, as the smallest pressure on the part may do harm, by interrupting the circulation of the blood in the external veins of the neck. Dr. Abercrombie observes, that the only jugular vein that can be opened is the external, which has little communication with the brain, and that opening the temporal artery is probably more beneficial. Many physicians consider bleeding from the saphena vein most advantageous; and if there is any difficulty in procuring the blood from other situations, this may be tried. The feet should be plunged in warm water, to favour its abstraction.

Local abstractions of blood are preferable when any doubt exists in the mind of the practitioner regarding the employment of general bloodletting, as in cases in which the symptoms are not strongly marked. Indeed, the same circumstances occasionally occur during the attack, as we have mentioned when speaking of the treatment to be adopted with a view of preventing the disease; namely, that there may be no prominent symptoms either of augmented or diminished vascular action; and in such cases it is often difficult to determine whether general bloodletting should be had recourse to or not.

When local bleeding is deemed advisable, the mastoid process, the nape of the neck, the temples, or between the shoulders, are the situations generally recommended. Some prefer one situation and some another. The operation of cupping being more prompt in its action, is to be preferred to the application of leeches. If leeches, however, be preferred, they are generally applied to the neck, occiput, and behind the ears. When epistaxis has preceded the attack, Lancisi and Cruveilhier recommend leeches to be applied to the inside of the nostrils, and if the patient has hæmorrhoids, to the margin of the anus.

Immediately after the bloodletting, a brisk purgative should be administered. It is often difficult, and even impossible, to administer cathartic medicines by the mouth. Dr. Copland, however, says we may always succeed by mixing ten or fifteen grains of calomel, sometimes with the addition of two or three grains of gamboge, with sweet butter, and placing it upon the root of the tongue. Two or three drops of croton oil given in the same way, or simply applied to the tongue, are even more efficacious, and may be followed in an hour or two by a purgative enema. If necessary, these remedies may be introduced into the stomach, suspended in thick gruel or mucilage, through an elastic gum tube. If no evacuations follow this treatment, its repetition will seldom fail to produce them. It is necessary to give a caution as to the exhibition of calomel, when the patient is unable to swallow. Dr. Bright mentions that on one occasion having placed a dose of calomel on the tongue it was not swallowed, but remained, and produced in a few hours the most alarming ptyalism, during which the tongue was forced out of the mouth, and it was necessary to scarify the organ deeply before it could be returned within the teeth. (*Hosp. Rep.* part ii. p. 337.) When dark, greenish-black, offensive stools are discharged, a torpid action of the liver is manifested, and purgatives, conjoined with mercurials, should be given at regular intervals, to keep the bowels open, and stimulate this organ to a healthy discharge of bile. Care, however, must be taken not to excite salivation. Preparations of antimony, and James's powder may be given at the same time, or combined with the mercury.

In conjunction with these remedies, the hair should be removed, and cold applied to the head, either in the form of affusions, or by folds of linen frequently saturated in a cold solution. A bladder containing pounded ice or snow may be used for the same purpose. It has been pointed out by Lallemand that the application of cold to the head acts locally only in diminishing congestion, and does not produce the same depression on the system as when applied generally to the surface. Its beneficial action is increased by warm applications to the lower extremities. Bran poultices, if readily procured, will be found an easy and excellent application.

If, after the use of the above remedies, the patient should recover his con-

sciousness, he is still to be watched with the greatest care; and should the pulse become weak and soft, slight restoratives should be given, but with the utmost caution, particularly before the twelfth or fourteenth day, as, until this period, the attack is very liable to return. During this time, therefore, the patient must remain in bed, with his head and shoulders elevated. The temperature of the room should throughout the period of treatment be moderate, and every circumstance that interferes with the tranquillity of mind or body should be carefully avoided and prevented. The injunction of Morgagni is always to be remembered, namely, to examine the hypogastrium, and remove any accumulation of urine by the catheter.

The treatment we have now described for apoplexy attended with increased vascular action would be highly dangerous at the commencement of an attack, or at any period of a seizure when the pulse is weak, or small and irregular, the temperature of the head not increased, the countenance pallid or sunk, and there is profound torpor, with laborious or stertorous breathing. These symptoms indicate a state that demands restoratives and gentle stimulants; such as small doses of Sp. Æther. Sulph. Co., preparations of ammonia, or even wine in small quantities, stimulating purgative injections, with turpentine, &c. The application of volatile substances to the nostrils, and sprinkling cold water suddenly on the face, are also useful. The application of cold to the head in cases connected with extreme prostration is often beneficial, especially if warm fomentations be at the same time applied to the inferior extremities. Lallemand gives a case in which the pulse was scarcely perceptible, even in the carotids; there was also general resolution of the limbs, stertorous breathing, and a cold clammy sweat on the surface, and yet the individual recovered under this treatment. (*Lettre 2^{me}*, obs. 28. p. 297.) The character of the pulse should not be our sole guide to the adoption of stimulating remedies, as it is often weak at the commencement of an attack that requires bloodletting, and rises subsequently; but when taken in conjunction with the other depressing symptoms, it is of great value. Blisters to the temples, behind the ears, and to the calves of the legs, are in these cases of advantage, while sinapisms, or stimulating frictions, may be at the same time applied to the extremities.

When hemiplegia, or any other form of paralysis, has preceded the attack, it is necessary to be very cautious, as it may in general be the effect of extravasation of blood, or of softening; either of which lesions will render the brain peculiarly liable to be acted on by any sudden change in the circulation, by which the patient may be exposed to fresh danger if incautious treatment be adopted. In old persons also much caution is necessary. Purgatives in these cases are decidedly useful, but they should not be so powerful, and are better when combined with medicines of an aromatic and somewhat stimulating character.

Numerous other remedies have been recommended in the treatment of apoplectic attacks. The exhibition of emetics has been already alluded to: most physicians consider that they are only useful when we have positive evidence that the attack arises from an over-distension of the stomach, narcotic poisons, or intoxication. In any other case they are not likely to produce any good effect, and may be highly dangerous. Mercury, we have already stated, may be useful, administered in the form of calomel, when the biliary secretion is suppressed or diminished. It has been supposed, by some, useful in promoting the absorption of the coagulum, and a slight mercurial course has been recommended for this purpose, when all immediate danger from the first symptoms has disappeared. Dr. Prichard when speaking of hemiplegia observes, "that those patients in whom a slight degree of ptialism has been produced, have almost uniformly appeared to him to derive material benefit from it, and their recovery has been more complete than that of others in whose cases the same remedy has either not been used or has not been administered to the same extent." Blisters, sinapisms, stimulating liniments,

and friction, may be used when the pulse is low, and there is evidence of depressed vital action. Setons, issues, and moxas, may be employed with the same view, and particularly when the attack has been preceded by the drying up of any chronic sore. Dr. Prichard has lately recommended the formation of a long issue, better made by the scalpel than by an escharotic, in the direction of the sagittal suture. Sternutatories, electricity, and galvanism, have rarely been found beneficial, and are generally injurious.

Means to be adopted with a view of obviating the effects of an Apoplectic Seizure and preventing its return. We have seen that it requires some months before a coagulum can be absorbed, and that occasionally a much longer time is necessary. It is therefore impossible to guarantee the safety of the patient when we are led to conclude there has existed an extravasation of blood into the substance of the brain. Even when congestion only has occurred, there is always a great tendency to its return. Under these circumstances the treatment is nearly the same as that recommended for preventing an attack. The patient, in general, should be kept rather low, in order to favour the absorption of the coagulum, and prevent the possibility of its giving rise to any irritation or inflammation in the surrounding substance of the brain. Of the use of mercury we have already spoken; and the preparations of iodine, from their well-known effects in promoting the absorbent powers of the system, might also be beneficial. The utmost care must be taken to avoid all the predisposing and exciting causes of the disease. The bowels should be kept regular by the use of gentle aperients. Moderate exercise may be allowed, but never to such an extent as to induce fatigue. The necessity of mental tranquillity should be impressed not only on the patient, but on his family and ordinary attendants, so as to prevent the sudden communication of either agreeable or afflicting intelligence. A too sedentary life, frequent stooping, and much indulgence in sleep, should be carefully avoided. After an attack of an acute character, when symptoms arise to demand evacuation of blood, occasional small bleedings, low diet, and a course of the natural or artificial purgative waters, will be necessary. The patient, also, should invariably sleep on a hair mattress, with the head and shoulders well elevated by a hair pillow, and rise early. When the disease is connected with diminished vital action, and we have no reason to suspect that extravasation of blood, has taken place, a tonic plan of treatment, gentle exercise in the open air daily, nutritious and digestible diet, with such remedies as increase the general tone of the system, should be employed. In those cases of congestive apoplexy, rising secondarily from involuntary seminal emissions, which M. Lallemand has pointed out to the profession, attention must be paid to the primary malady, and the means he recommends adopted, with a view to its cure. (*Des Pertes Séminales Involontaries.*)

The treatment of chronic paralysis which follows apoplexy, will be noticed under PARALYSIS.

INSANITY.

Explanation of terms and enumeration of the different forms of insanity.—General or incoherent insanity, including mania and dementia.—Moral insanity.—Monomania and melancholy.—Instinctive madness, or insane impulse, including, 1. Homicidal impulse; 2. Pyromania; 3. Suicide; 4. Other morbid propensities.—Progress and terminations.—Anatomical characters.—Diagnosis.—Causes.—Treatment—remedial—moral.—Of Hypochondriasis—its causes, nature, and treatment.—Of Puerperal insanity and its treatment.

INSANITY and madness are precisely synonymous expressions, the former being a term naturalised in our language, and substituted by custom, or used as an equivalent for the old English word madness.* Insanity, in a legal acceptation, is synonymous with unsoundness of mind, but not strictly so in a medical sense. Mental unsoundness is defined by lawyers to be a condition of the faculties, which renders an individual incompetent to discharge the ordinary duties of life, and to take care of himself and his affairs. Now it is obvious, that a person labouring under a fit of intoxication, or of apoplexy, or under the delirium of fever, or one who has fallen into the second childhood of old age, is unsound of mind, or “insanus,” according to this sense of the expression, although he is not a lunatic or madman. The medical or pathological acceptation of the term insanity is, therefore, somewhat different from the meaning which lawyers affix to the expression of mental unsoundness. It is restricted to that unsoundness which is the result of a particular disease, or rather a particular class of diseases, known to impair the mental faculties in various ways and in different degrees. The symptoms of these disorders are so complex, that it is impossible to comprehend them all under one definition; and, perhaps, the best substitute that we can furnish for such a definition, is to enumerate briefly the several forms or varieties of morbid mental phenomena, which are comprehended under the term insanity, or the corresponding expression—madness.

If a person of correct observation goes through an extensive hospital where lunatics of various descriptions are assembled, with the view of noting the principal varieties of madness; and endeavours, for that purpose, to enter into conversation with the inmates, the most essential distinction that he will remark in the phenomena presented to him will be the following:—Some of these individuals will appear capable of conversing, and will even express themselves for a time in a manner not strikingly different from that of sane persons; they will make remarks and utter sentences, which, if not perfectly sensible and rational, will be at least intelligible and connected; their thoughts do not appear to be confused; their ideas and expressions are coherent. Other individuals, perhaps an equal number, will be found quite incapable of reasoning, and often of expressing a single proposition; the thoughts of these last are confused and incoherent; their ideas do not succeed each other according to the usual laws of association or sequence; their sentences are broken by the intrusion of thoughts which crowd themselves upon the mind, and render it hurried and confused; their conduct displays, in like manner, a want of any distinct purpose or intention; they are incoherent madmen. Many of them are subject to occasional periods of unusual excitement; when their passions are roused, they become boisterous and violent. Their minds are agitated by

* This word may be recognised in several of the Indo-European languages: *Madah* is madness in Sanskrit; and *madayati*, he drives mad, or insane. See Professor Wilson's Lexicon, p. 30.

a variety of illusions or false impressions, which fill them with anxiety and terror, or with anger and rage: they are then raving madmen or maniacs; but when this excitement ceases and some degree of tranquillity is restored, they return to the ordinary state of calm incoherence, and this incoherence is often the most characteristic feature in their psychological state.

Insane persons of this latter class are said to labour under general or universal madness. When the disorder is accompanied with illusions and with violence, and principally in the early stage, while incoherence is not always so decided as it afterwards becomes, the disease is termed mania: in the later period it is named dementia, the characteristic of which is a more complete incoherence producing fatuity, and at last a total obliteration of the mental faculties. Dementia is the advanced stage or the termination of mania, but the two states are not so distinct as they are by most writers represented to be, for there is always some incoherence in mania, and sometimes this is the only, or the principal, feature of the disease, even from its commencement.

Maniacs and demented persons, or incoherent lunatics, as they may be termed, collectively constitute half, or more than half, of the inmates of many hospitals for the insane. The other part labour under coherent madness, or what is termed partial insanity. Madmen whose thoughts are coherent, and who are capable of expressing themselves in a connected and intelligible manner on many subjects, are a very different class of persons from the incoherent. Their disorder has been termed by French writers, *folie raisonnée*. The most striking phenomena of their condition are not displayed in their words but in their conduct; their actions and gesture, and their whole manner of existence, are extraordinary, and different from that of sane persons. On conversing with these persons it is discovered, though occasionally not without a careful investigation, that some of them labour under an illusion as to their personal identity, or some circumstance connected with their state or relations; they are insane in reference to a particular idea or a particular train of thoughts, while their notions regarding other subjects are tolerably correct. Persons thus affected are the *monomaniacs* of modern writers. Other individuals in the class above described betray no symptom of *unreason*; they labour under no illusion whatever; their understandings are not perceptibly deranged; their habits and manners are singular and eccentric; their principal disorder is a perverted and unnatural state of their moral feelings and affections: it constitutes what has lately been denominated moral insanity. There is one division of partially deranged persons, whose disorder is termed *melancholia*; they are sometimes comprehended among the two classes above-mentioned, but their complaint differs from other varieties of partial insanity, by bearing the constant appearance of sorrowful dejection; they are melancholy and miserable. If they have any illusion, it is in harmony with the prevalent tone of their temper and feelings. They fancy themselves lost, damned, hated of all mankind, accused justly or unjustly of flagitious crimes. The disorder of these persons comes under the head of moral insanity or of monomania, according as they are free from illusion, or labour under that characteristic symptom.

There is another class of persons whose disorder is insanity, and often of a very appalling and dreadful kind, but who are seldom seen in lunatic asylums, or not so often as they ought to be. These individuals are, during the greater part of their time, apparently sane; but they are subject to occasional impulses which drive them to commit or attempt horrible acts, such as homicide, suicide, arson, or other deeds of violence, and occasionally of sensual and abnormal depravity. The gallows and the gibbet have been, owing to the ignorance of judges and juries, the destiny of many belonging to this class who ought to have been consigned to lunatic asylums. Their state will be described under the head of *Instinctive Madness*, or *Insane Impulse*.

I. GENERAL OR INCOHERENT INSANITY, INCLUDING MANIA AND DEMENTIA.

1. *Mania*. The onset of mania, or raving madness, is seldom altogether sudden, or without precursory symptoms, which serve to give warning of its approach. In acute mania the precursory stage is shorter and less strongly marked than in the other forms of mental derangement; but, even in this disease, its existence may perhaps always be traced on a careful investigation, and it is in general striking and manifest. It is found on inquiry, or is related by the friends of the patient of their own accord, that his conduct has been for days, or for weeks, or even for months, singular and different from his usual behaviour. This precursory stage of insanity has been termed by some the period of eccentricity. The patient during this interval between the healthy and natural state of his mind and the decided attack of disease is subject to fits of occasional excitement of passion, accompanied with some confusion of ideas. He passes days in a state of feverish agitation and general uneasiness; is full of activity, and displays a morbid energy in the pursuits on which he is intent, in which however he performs nothing, his projects being for the most part trifling and absurd. He loses his appetite or neglects food, passes sleepless nights, either lying awake and fatiguing his mind with anxious speculations, or rising often and walking to and fro in a state of uneasiness and perturbation. At length his reason is found to be disordered: he appears scarcely to know what he says, talks nonsense, repeats his words frequently, is unable to complete the sentences which he begins, and makes ineffectual efforts to recollect his thoughts, utters rapid and confused expressions in an impetuous manner, cries, laughs, appears irritable, and prone to anger, though perhaps naturally of mild and sedate temper, is impatient of the most trifling opposition, and absurdly obstinate and capricious, expressing his feelings with an unreasonable degree of warmth and enthusiasm.

The morbid state of a person under these circumstances is always apparent to those who surround him, but it is sometimes doubted whether he is completely mad, and a proper subject for restraint, until some attempt being made to oppose him and interfere with his wild pursuits, he breaks out into a degree of violence which obviously requires coercion; and sometimes, though this is not a constant phenomenon in mania, shows that he has laboured under the influence of an unperceived delusion, an insane and absurd impression as to his own person or his relation to others.

Attacks of madness frequently come on attended with symptoms of febrile excitement, heat of skin, whiteness of the tongue, thirst, and rapidity of pulse. It is often difficult to determine whether these phenomena are probably symptoms of the disease, or result from the constant agitation of the patient. Occasionally indeed there are well-marked indications of vascular turgescence in the head, and even of a state bordering on phrenitis. This, as it might be supposed, is most frequently the case when the disease follows causes of strong excitement, such as a fit of intoxication, or exposure to the heat of the sun, or some injury of the head. In females mania frequently makes its approach with hysterical symptoms, as with paroxysms of sobbing, crying, laughing, attended with a sense of suffocation and with a suspension of consciousness. When the disease is fully developed the state of the patient is manifest. He sometimes breaks out into a fit of raving madness, in which anger is the predominant feeling, and this is directed against his nearest relations or most affectionate friends, who are under the necessity of exercising restraint and resisting his absurd attempts, and who have perhaps threatened to put him into confinement, or have perhaps carried the proposal into effect. As the disorder approaches its highest pitch, the current of ideas becomes more and more turbid; the thoughts and feelings are expressed with cries and ejaculations, and with agitation displayed in the manner and countenance, with violent and irregular

movements and gestures; the internal sentiments, or feelings, so absorb the attention, that the patient becomes almost unconscious of external impressions. Many individuals abandon all regard to cleanliness and decency, and become filthy and disgusting in the extreme. All the functions of the body are in these circumstances of the disease affected: the bowels are irregular, the tongue is furred, the skin cold and clammy, the patient excretes saliva mixed with mucus, his features become haggard and maniacal, and his eyes watery and suffused. In some instances the countenance of the individual is so much altered in expression, that his nearest relatives scarcely recognise him.

The symptoms of madness often vary according to the predominance of particular emotions or feelings in the natural disposition of the patient; and the individual character of the disease is in some measure determined by the mental habits and temperament. But this is not uniformly the fact. Sometimes the mildest and most gentle persons become violent and abusive, and delicate females of modest and retired habits utter the most obscene expressions in a manner surprising to those who had been previously acquainted with them. Many appear completely out of themselves, if such an expression may be used, and as if possessed by an evil spirit suggesting thoughts and feelings foreign to their nature and to the habit and tenor of their minds. Mania as well as monomania is a disease affecting the passions, and it often appears to consist principally in the morbid exaltation of feelings. In some, anger, in others joy or sorrow, is the prevalent state of the mind. Cases of this description are sometimes supposed to be examples of monomania; but this is an error, since, by the term monomania, it is intended to designate partial insanity, or a form of mental disease in which the patient is capable of reasoning calmly and coherently on subjects unconnected with a particular train of thought, or with some single hallucination or illusion. In acute mania it sometimes happens that a particular impression predominates for a time and occupies the mind to the exclusion of all other thoughts and feelings; but then there is no coherence; the ideas are hurried and confused on every attempt to express them; and it is often observed that the impression is changed after an interval of quiet, or a short period of sleep, and that some different train of ideas now occupies the mind, having a similar relation to the prevailing state of the feelings. Those maniacs who are agitated by terror fancy at one time that they are about to be devoured by wild beasts, at another that they are surrounded by devils, or about to be hanged or drowned.

The period of greatest intensity in which acute mania assumes its completely developed form, has been termed by Chiaruggi the second stage. This writer, whose graphical delineation of madness has been much celebrated, and has been cited by writers in various languages, has thus described the confined period of raving madness:—"In the second stage anger, violence, and the loss of reason, manifest themselves in their greatest intensity; shrieking, roaring, raging, abusive expressions and conduct towards the dearest friends and the nearest relations, who are now looked upon as the bitterest enemies. The patient tears his clothes to tatters, destroys and breaks in pieces whatever comes in his way. A striking and characteristic circumstance is the propensity to go quite naked. Whoever touches the patient is abused or struck by him; strange confused ideas and absurd prejudices occupy the mind. Stillness soon follows, or a murmuring sound, as if the patient were alone; on the other hand, when he is alone, talking and gesticulating as if he were in company. If such individuals are confined and tied during the height of their paroxysms, for their own security or that of others, nothing can be compared to the truly satanical expression which their countenances display. In this state, they throw hastily away, with cries and shrieks, all the food presented to them except fluids, which thirst compels them to receive. When after some days hunger begins to be felt, they swallow every thing with brutal greediness; they even devour, as it has often been observed, their own excrements, which, black and offensive, escape from them in great quantity,

or smear with them clothes, beds, and walls. Notwithstanding his constant exertion of mind and body, the muscular strength of the patient seems daily to increase; he is able to break the strongest bonds and even chains; his limbs seem to acquire a remarkable nimbleness and pliability, and a singular aptitude of performing movements and actions which appear almost supernatural." Chiaruggi saw a woman, who, clothed in a straight waistcoat and laced down in her bed like a child in a cradle, drew out her limbs from this double confinement with the greatest nimbleness and pliancy. Bold however, and impudent as such patients are, yet they are according to common observation, although not without exception, easily daunted by a strong threatening voice, by the sight of stocks, by close yet harmless restraint. After their violence has expended itself, they become still and gloomy; appear to be reflecting or brooding over something concealed; but they break out again before it can be anticipated into a new storm of rage. At length comes on the *third stage*. A real cessation of violent paroxysms now ensues, exhaustion, sleep, though unquiet, disturbed by fearful dreams. The pulse is small, the aspect of the whole body squalid, the countenance pallid and meagre. The patient is obdurately silent, or sings and laughs in a strange manner, or chatters with incessant volubility. These uncertain intervals, which often put on the appearance of fatuity, are frequently interrupted by new but short renewals of violence. Memory, for the most part, remains unimpaired through all the stages, and, during the highest intensity of the disease, the senses appear to acquire an unusual degree of acuteness and susceptibility. A patient who had recovered described to Chiaruggi all the scenes of his wild reverie and long-continued mental perturbation. It has often been remarked, that maniacal patients of this description are never attacked by any epidemic, and are seldom affected by any contagious malady. As Mead and many other writers have observed, even consumptive disorders, dropsies, and other chronic maladies, have disappeared on the accession of violent insanity. When patients are not freed from the disease after a succession of attacks, which come on like so many paroxysms of fever, one or another of the following events ensues, — either the powers of mind are exhausted to that degree that the disease subsides into a permanent fatuity; or this appearance of fatuity is only a space of calmness interposed between relapses of violent madness, which now and then break out, like the eruptions of a volcano, after a long period of repose; or the patient falls into a state of melancholy, or of complete mental confusion; or, finally, his madness becomes chronic, and he scarcely recovers from this condition, in which sense and understanding appear to be lost in incoherence. Chiaruggi saw a woman who had sat during twenty-five years on a stone-floor in a fearfully demented state, beating the ground with her chains without ceasing, night or day.

It appears that attacks of acute mania often attain their utmost degree of intensity, and begin to decline and undergo a remission, or a species of imperfect crisis, at a period of no long duration after the first appearance of severe symptoms. It is the opinion of M. Esquirol, that such a change may generally, or at least frequently, be perceived to take place within the course of a month, from the commencement of an acute attack. Certain it is, that, in the generality of cases, the symptoms of extreme violence subside in a greater or less degree, and that intervals of at least comparative quietness are perceived. Such a remission is sometimes a prelude to gradual recovery; at others it is followed by a milder but protracted derangement, breaking out into occasional exacerbations, and terminating in a permanent obliteration of the faculties. This last condition is commonly called fatuity, or dementia.

II. *Dementia*. Insane persons often survive for many years the permanent loss of reason. Some continue very long to display nearly the same phenomena of mental disorder, with alternations of increased and subsiding violence; but the generality, if no recovery or lucid interval take place, sink gradually into a state of fatuity or decay of the mental faculties, which French writers

after Pinel have denominated *démence*. English writers have translated this term into *dementia*, meaning, to distinguish by it, that peculiar form of mental weakness which is the consequence of insanity and other diseases of the brain, as distinguished from that fatuity or imbecility which is connate or original. The term fatuity would answer the purpose equally well, if its meaning were restricted. It is important to distinguish this kind of acquired fatuity from primary or congenital idiotism, since mistakes have often been made, especially by lawyers, from ignorance of the nature of these morbid states, or inattention to the characters which distinguish them.

The approach of dementia or fatuity is indicated by an increased degree of incoherence in the ideas of the insane. At the first attack of general madness there is always a want of order and connection in the ideas or thoughts, which may be observed not to follow each other in their usual trains of sequence. This may be resolved into a failure, in greater or less degree, of the power exercised by the will over the trains of ideas. It is evident when a lunatic begins to talk, that he cannot call up and arrange his ideas and expressions as he was wont to do; his thoughts immediately wander, nearly as the thoughts of a man considered to be of sane mind are observed to do, when, his attention being defective, some casual association, such as the double meaning of a word or a coincidence in sound, is sufficient to make him forget what he was going to say, and diverge to something quite foreign to his purpose. This appears to be one of the essential characters of the mental disorder which constitutes madness, or at least general mania. An increase of this defect indicates the approach of dementia. At the same time the emotions become less vivid and definite—the feelings more obtuse. The state of dementia when fully developed is characterised by “an unceasing current of unconnected thoughts and evanescent emotions.” Pinel has given the following definition of it:—“*Idées incohérentes entre elles, et sans aucun rapport avec les objets extérieurs.*”—“*Une mobilité turbulente et incoercible, une succession rapide et comme instantanée d’idées qui semblent naître et pustuler dans l’entendement sans aucune impression faite sur les sens, un flux et reflux continu et ridicule d’objets chimériques qui se choquent, s’alternent, se détruisent les uns les autres sans aucune intermission et sans aucun rapport entre eux, le même concours incohérent mais calme d’affections morales, de sentimens de joie, de tristesse, de colère, qui naissent fortuitement, et disparaissent de même, sans laisser aucune trace, et sans avoir aucune correspondance avec les impressions des objets externes: tel est le caractère fondamental de la démence dont je parle.*”

This state of mental decay, or of destruction of mental power, has been confounded with idiotism, which in all its degrees and modifications is a very different affection. The distinction, which is a very important one, has not always been kept in view by writers on disorders of the mind, and even in the works of Pinel we find it sometimes overlooked. M. Esquirol has the merit of having drawn more accurately the line of discrimination. He refers to dementia all the cases of effete or obliterated intellect, which are the results of maniacal or other diseases, and are incident to persons originally possessed of sound faculties, and includes those defects only under idiotism which are original or congenital. “The imbecile,” he observes, “have never possessed the faculties of the understanding in a state sufficiently developed for the display of reason. The victim of dementia was once endowed with them, but has lost this possession. The former lives neither in the past nor the future; the latter has some thoughts of times past, reminiscences which excite in him occasional gleams of hope. Imbecile persons, in their habits and manner of existence, display the semblance of childhood; the conduct, the acts of the demented preserve the characteristics of consistent age, and bear the impress derived from the anterior state of the individual. Idiots and cretins have never possessed memory, judgment, sentiments; scarcely do they present, in some instances, indications of the animal instincts, and their external conformation plainly indicates that they were not organised to be capable of thought.”

In the author's work on insanity four stages of dementia are distinguished, each of which is characterised by peculiar phenomena. Some practical advantages, with respect to legal arrangements for the insane, and the calculation of a probable event, may, in many instances, arise from this distinction. Each of these four degrees of dementia is susceptible of an appropriate designation, derived from the most remarkable of the phenomena displayed by it, and the terms will be found useful in assisting the memory, and rendering the notions, especially of jurymen in inquests of lunacy, more precise and positive.

The first stage of dementia is that of forgetfulness or impaired memory. It is characterised by the momentary obliteration of recent impressions, while the memory retains a comparatively firm hold of ideas laid up in its recesses from times long past; the power of reasoning within the sphere of distinct recollection is not remarkably impaired; and the faculty of judgment is exercised in a sound manner when the attention can be sufficiently roused. The disease of incoherence approaches most gradually and slowly when it comes on as the symptom and accompaniment of old age: it is in such instances that its several degrees are most clearly recognised and distinguished. It is particularly in this modification of dementia that the commencement and slow advances of the first stage can be most distinctly traced. It seems to begin with dulness of perception or apprehension. The organs of sense are not so perfect in advanced age as in the more healthy and vigorous periods of life; sensation is not so acute, but it is rather in the subsequent recognition which the mind makes of the ideas presented to it, than in sensation itself, that the defect chiefly lies. Perception indeed takes place, but the impression is momentarily evanescent. The individual sees and hears; he replies to questions, but his attention is so little excited, that he speedily forgets what he has said, and repeats the same remark or inquiries after a few minutes. At the same time ideas long ago impressed upon the mind remain nearly in their original freshness, and are capable of being called up whenever the attention is directed towards them. Sensations produced by present objects are so slight, and the notions connected with them so confused and indistinct, that the individual affected scarcely knows where he is, yet he recognises without difficulty persons with whom he has long been acquainted; and if questioned respecting his former life he will often give pertinent and sensible replies. The disorder of his mind consists, not in defective memory of the past, but in the incapacity for attention and for receiving the influence of present external agencies, which in a different state of the cerebral organisation would have produced a stronger effect upon the sensorium, or seat of sensation and perception. It has been said, that in senile decay the phenomena of incoherence in the first degree are most distinctly marked. Traits of the same description may, however, be observed in other cases of dementia. The memory of those who labour under this disease in the early stage, from whatever cause, and in whatever period of life it may have arisen, is like that of aged persons, more tenacious of long-past than of recent events; the latter make so feeble an impression that it is speedily obliterated. In such persons all the powers of the mind are greatly weakened; they have no aptitude to any train of thought or action; and they are quite unable to fulfil the duties of their business or profession; they cannot combine a variety of considerations in order to arrive at any practical conclusion; cannot enter into any affairs of importance, or comprehend any continued conversation; all their discourse is marked by diffuseness and incoherence.

The second stage of dementia is characterised by a total loss of the reasoning faculty: the energy of the will over the train of thoughts is impaired to such a degree as to deprive the individual of all control over his associated ideas, and render him incapable of any effort of the mind, or of carrying on the series of thoughts to the end of a sentence or proposition. He hears a question, apprehends sometimes its meaning, and attempts to answer, but before he has uttered the half of his reply his mind becomes confused and bewildered; some

accidental suggestion turns aside the current of his ideas, which are too loosely associated to remain coherent, and his expressions become consequently absurd and irrelevant. It is sometimes easy to observe the point at which the intention of the speaker ceases to direct his words, and at which the ideas are drawn aside into a different course. The individual begins to talk of one thing, and before he has spoken half a minute he has wandered into subjects so remote from it, that some care is required to trace the links by which his thoughts have reached the point at which they are found. This degree of incoherence is generally to be observed as a prelude to a more severe and complete form, which will be next described. Until the mind has passed into the more advanced stage, glimmerings of sense and reason are displayed; the individual affixes some meaning to his words, though he soon forgets it. The memory is not entirely lost, though much impaired, its defects resembling in kind those of senile memory, but exceeding them in degree. Many individuals in this state of dementia know and remember their friends or relatives, but seldom display signs of emotion or sensibility on being visited by them. Not a few even in this state are capable of being employed in mechanical occupations. Females knit or sow, or perform any work with their hands to which they had been previously habituated; and men draw, or write letters or sentences, in which however their imbecility is generally conspicuous. Some patients have occasional periods of greater excitement, in which the symptoms of a more active stage of madness resume their prevalence.

The third stage of dementia, or that of incomprehension, is characterised by a total inability to comprehend the meaning of any question, or proposition, however simple. If the attention can be ever so slightly roused, the reply attempted is always so remote from the subject, as plainly to indicate that the question has not been understood. This may be termed the instinctive stage of dementia. Reason being entirely lost, and the instinctive or mechanical principles of action still remaining in vigour, the latter display themselves more remarkably. The demented person in this degree is the creature of instinct and habit. Bodily force and activity survive, and are often remarkably displayed, and assume the appearance of trick or habit. Some jump, or run to and fro, or walk round perpetually in a circle. Some dance and sing, and vociferate frequently. Many talk incessantly in the most unmeaning jargon; others pass their time in muttering half sentences and broken expressions, in which it is scarcely possible to discover any link of connection, or if any association can be traced, it is of the most trivial kind, and depending on a word, or on some sensible object, which for a moment attracts a degree of attention. Many on the other hand sit in silence with a tranquil look, sometimes with a vacant smile or unmeaning stare, and scarcely pronounce a syllable for weeks, months, or even for years. A few remain crouched in a particular posture, apparently uneasy and painful, but if placed in a different manner by those who have the care of them, they soon resume their habitual position. Many demented persons crowd round a stranger who happens to visit a lunatic asylum, having just enough intelligence to perceive something new. Some have a propensity to adorn themselves in a strange manner; they take any thing that happens to be in their way, and append it to their dress which is singular and ridiculous.

In the fourth stage of dementia (inappetency—loss of instinct), even the animal instincts are lost. The miserable victim of disease has merely organic or physical existence; he appears scarcely conscious of life; has neither desires nor aversions; and is unable to obey the calls of nature. Scarcely any exhibition of human suffering can be more deeply affecting than the aspect of a group of lunatics reduced to the last stages of fatuity. Sometimes an individual may be seen always standing erect and immovable, with his head and neck bent almost at right angles to his trunk, his eyes fixed upon the ground, never appearing by any movement or gesture to be conscious of external impressions, or even of his own existence. Another sits on a rocking-chair, which she agitates to and fro, and throws her limbs into the most uncouth po-

sitions, at the same time chaunting or yelling a dissonant song, only capable of expressing a total inanity of ideas and feelings. Many sit constantly still, with their chins resting upon their breasts, their eyes and mouth half open, unconscious of hunger and thirst, and almost destitute of the feelings which belong to merely physical life; they would never rise, or lie down, were they not placed in bed. A great proportion of the patients who are reduced to this degree of fatuity are found to have lost the use of their limbs in a greater or less degree by partial or general paralysis. This state is not however always uniform; some of them have comparatively lucid intervals, in which nature seems to make an effort to light up the mind, and recall lost impressions and ideas. A patient who had been several years in the same state, sitting all day in a wooden elbowed chair, with his chin hanging over his breast, apparently hardly conscious of existence, who would not eat if food were not put into his mouth, appeared occasionally to rouse himself, and for a short time to recover an unusual degree of animation. At such periods he would sometimes read a chapter in the Bible with a clear voice and a distinct and intelligible articulation. Such occasional variations in the state of demented persons are not infrequent. They are capable of being raised by favourable influences from a lower degree of their disease into one which is above it in the scale.

II. MORAL INSANITY.

Moral insanity, though a well-marked and frequently occurring form of mental derangement, was first recognised and described by the writer in the *Cyc. of Pract. Med.*, and afterwards in his work entitled, *Treatise on Insanity*.* It is there defined as consisting in "a morbid perversion of the feelings, affections, and active powers, without any illusion or erroneous conviction impressed upon the understanding." In the above work it is thus described,—“There are many individuals living at large, and not entirely separated from society, who are affected in a certain degree by this modification of insanity. They are reputed persons of singular, wayward, and eccentric character. An attentive observer may often recognise something remarkable in their manner of existence, which leads him to entertain doubts of their entire sanity; and circumstances are sometimes discovered on inquiry, which assist in determining his opinion. In many instances it is found, that there is an hereditary tendency to madness in the family, or that several relatives of the person affected have laboured under diseases of the brain. The individual himself is discovered, in a former period of life, to have sustained an attack of madness of a decided character. His temper and dispositions are found on inquiry to have undergone a change, to be not what they were previously to a certain time; he has become an altered man; and this difference has perhaps been noted from the period when he sustained some reverse of fortune which deeply affected him, or since the loss of some beloved relative. In other instances the alteration in his character has ensued immediately on some severe shock which his bodily constitution has undergone. This has either been a disorder affecting the head, a slight attack of paralysis, a fit of epilepsy, or some fever or inflammatory disorder, which has produced a perceptible change in the habitual state of the constitution. In some cases the alteration in temper and habits has been gradual and imperceptible; and it seems only to have consisted in an exaltation or increase of peculiarities, which were always more or less

* Dr. Ray, an American writer on the medical jurisprudence of insanity, who has cited the above passages, observes that Pinel was the first writer who distinctly recognised the existence of moral insanity. Pinel, who termed the affection which he described, *Emportement manie-que sans délire* and *Manie sans délire*, had in view only one particular aspect of moral insanity, viz. that which will be described under the designation of *Instinctive Madness*, or *Insane Impulse*. M. Esquirol, who in his late excellent work has translated a great part of the series of cases given in the *Treatise on Insanity* above cited as exemplifying this disease, has observed that the moral derangement, designated by the term used at the head of this section, is very different from the instinctive madness of Pinel: they are both forms of insanity without lesion of the understanding, or at least without illusion and the belief of unreal facts.

natural or habitual." "Individuals labouring under this disorder are capable of reasoning or supporting an argument on any subject within their sphere of knowledge that may be presented to them; and they often display great ingenuity in giving reasons for their eccentric conduct, and in accounting for and justifying the state of moral feeling under which they appear to exist. In one sense, indeed, their intellectual faculties may be termed unsound; but it is in the same sense in which persons under the influence of strong passions may be generally said to have their judgment warped, and the sane or healthy exercise of their understandings impeded. They think and act under the influence of strongly excited feelings; and a person sane is, under such circumstances, proverbially liable to error both in judgment and conduct."

Moral insanity is, as has been observed, by no means rare. In a report of the lunatic hospital for the state of New England it is observed by the writer, Dr. Woodward, who has examined the records of the hospital with a view to this particular inquiry, that at least one fourth of the lunatics committed by the courts (of that state) belong strictly to the class whose disorder is moral insanity. This however comprehends, and perhaps chiefly consists of, cases referrible to the head of *Instinctive Insanity*, or *Insane Impulse*.

For a series of characteristic examples of moral insanity the reader is referred to the author's *Treatise on Insanity*.

It has been objected against the admission of moral insanity as a form of mental derangement that, by recognising the existence of insanity without illusion, we lose sight of the only tangible and clearly marked boundary between eccentricity and madness. Modern lawyers and writers on medical jurisprudence have laid down the dogma, that illusion or hallucination is essential to mental derangement, and a criterion of its existence. The late Sir John Nicholl in a celebrated decision insisted strongly on this distinction, which he illustrated in a very able, lucid, and to many satisfactory, manner; he showed that his opinion derived support from the decisions of former lawyers, among whom were Lord Coke and Lord Hale. He likewise cited the evidence of Dr. Battie and Dr. F. Willis, and he might have adduced many other authorities directly to the point from among the medical writers of this and other countries. But the decisions of courts of justice, and even the opinions of the most learned lawyers and physicians, cannot impose laws on nature, or on the physical constitution of man.

There is a modification of insanity without illusion, or the belief of any unreal or imaginary fact, which consists merely in moral perversion; and the existence of this morbid state is now beginning to be universally recognised, though formerly denied; and the matter of fact being such, it is to no purpose to pre-empt all notice of it in legal provisions for the care of the insane, and for the protection of those who are of sound mind. It has been said, that an admission of the existence of moral insanity as above defined, confounds madness with eccentricity; and that persons whose character is harmless and merely singular and eccentric, will be liable to the allegation of mental derangement, and may be deprived, without any sufficient cause, of their liberty and civil rights. But this is founded on a misconception of the nature and foundation of proceedings in all inquiries concerning the existence of insanity. The question which jurors have to determine in such investigations is, not whether the individual brought under their cognisance is, according to any abstract or settled definition, affected with insanity, but whether his mental state is individually such as to render him an unfit person to be at large and to be entrusted with the care of himself and his property. It is important to be aware of the general fact, that persons are liable to fall into a state in which they may lose this capability through the effect of disease (namely, that termed moral insanity), without displaying those phenomena which were heretofore reckoned essential to madness; but whether in each particular case the person affected is in the predicament above-mentioned is to be determined by evidence. Be his eccentricity ever so great, and ever so strikingly and undoubtedly morbid, or the consequence of

disease affecting his brain or nervous system, still there will be no plea for putting him under confinement, or taking from him the care of his property, unless it can be shown that other persons, or himself, are likely to suffer in body or estate from his odd manner of conducting himself. If however we are obliged to discuss the question, whether eccentricity is in general allied to madness, and even a modification of that state or not, there is no doubt that the decision would be in the affirmative. It is well-known that persons who have been decidedly insane, or who have laboured under one of the usually recognised forms of madness, often remain eccentric during life, after their reputed recovery : others are eccentric for an indefinite period beforehand, and their eccentricity is a precursory state to declared madness. Monomaniacs, who are considered insane only on one particular point, are often eccentric in the whole of their conduct. Moreover, it may very commonly be observed, that in families in which many individuals have displayed symptoms of decided insanity, some others are only eccentric, and are reputed to be such through life.

We shall conclude what we have to say upon the subject of moral insanity for the present by enumerating briefly the most characteristic features of that disorder.

1. *A state of excitement.* Periods of excitement, often lasting for months, alternate with others of corresponding depression. Sometimes the excitement is permanent, or it lasts until the patient returns gradually into his usual and healthy state, without any interval of an opposite condition. An unusual degree of hilarity and joyous excitement is, in many instances, the most characteristic difference between the morbid and the healthy state of the person affected.

The excitement of moral insanity is very similar to that which is produced in many persons by intoxication ; they even describe their feelings after recovery as precisely analogous to those of persons half-drunk or slightly under the influence of strong liquors. It is probable that a state of the brain is induced by morbid causes nearly bordering on that condition to which alcohol or wine gives rise under ordinary circumstances.

2. *Absence of reserve.* Nothing is more striking in cases of moral insanity, than a total absence of that prudential or decent reserve or circumspection which in various degrees is habitual to most persons, especially in the well-educated, in their sane and natural state. The insane feel no repugnance to expose all their thoughts and feelings. It seems never to occur to them, that any thing should be concealed, because the open avowal and exposure is unbecoming. They often talk loudly and coarsely to perfect strangers about their family affairs, their property, and their feelings towards their nearest relatives ; complain of ill-treatment from one, and testify the most unbounded affection to another, which is liable to be reversed on the slightest caprice, and expose their inmost thoughts to every person indifferently.

3. *Garrulity* is another feature of their disorder. Many enter into long stories always relating to themselves ; their narratives are often very characteristic, and display in a most curious manner the singular state of their mind and feelings. Their memory is often surprisingly accurate, even in the most trifling particulars ; they make long digressions, and explain the motives which influence them, or by which they profess to have been influenced, in their most singular and absurd actions, and generally with a view to account for their conduct, and make it appear more reasonable or more like that of other men. Some lose themselves in long digressions.

4. *The propensity to make extravagant purchases* is often very striking in moral insanity. The particulars of some cases of mental disorders in which this feature was very remarkably displayed, are detailed in the author's work already alluded to. A farmer who was affected with the same disease, used to go to the markets, and fairs, and sales, in the neighbouring counties, and make great purchases of live stock ; he would buy household furniture, carriages, horses, without any rational intention or prospect of disposing of them. The

writer has seen a lady whose disorder showed itself in a similar way. She used to go to jewellers' shops, and make purchases of the most expensive trinkets and ornaments without end. Her extravagance and disposition to run in debt was such, that it was the main inducement with her family to sue for a writ; she was declared of unsound mind, and ordered to be put under control. This person laboured under no illusion or hallucination: her moral feelings were in disorder.

5. *A total disregard of veracity and of moral obligations in general* is a feature of this form of mental disorder. Persons who profess no disregard of religion, display a perfect want of any moral control over their conduct; they tell gratuitously the most palpable falsehoods, and have no regard whatever to the morality of their actions.

6. *An irresistible propensity to drinking fermented and other intoxicating liquors* is often the result of moral insanity, and one of the principal characteristics of particular cases. The state of the individual after this indulgence becomes changed into that of a raving maniac; and what characterises it and distinguishes it from the ordinary effects of drunkenness is its permanence. A day or a night will suffice for the recovery of a drunkard from the immediate effects of his debauch; but an insane person, whose disorder is produced or aggravated by a similar cause, is often weeks or even months before he returns to his previous condition. A very small quantity of wine often gives rise in such persons to unusual excitement; the disturbance which it occasions is both greater and of longer duration than in healthy persons.

7. *Perfect selfishness* marks all the conduct of the morally insane. They are generally indifferent to the feelings of others, and only consult in every thing their own personal gratification, and particularly the gratification of their bodily appetites.

8. *A dislike towards relations and friends* formerly beloved, and even the objects of their warmest affection, is well-known to be a feature of madness, and it belongs particularly to moral insanity. Husbands and wives conceive aversion and repugnance, who had always displayed in the sane state the greatest fondness and tenderness. Mothers dislike their children, or are perfectly indifferent to them, and pass months without making any inquiry about them.

9. *A proneness to suspicion* is often very manifest; the most trifling circumstance is often sufficient to give rise to a train of formidable apprehensions which the insane person harbours, and over which he broods, until he comes at length to believe them as matters of fact: the disorder then passes into monomania. Nothing is more common in morally insane persons than a dread of being poisoned. It is an unfavourable symptom, and marks a tendency in the disorder to become converted into monomania, or acute melancholy dejection.

10. *Melancholy* (sorrowful dejection of mind, or lowness of spirits), without any erroneous belief, or the conviction of any unreal fact impressed upon the understanding, is a form of moral insanity, inasmuch as the disorder extends not beyond the moral feelings and sentiments, and the disposition of the mind with respect to hope and fear; it affects not the intellect, which remains unclouded. Persons in this state have no relish for the enjoyments of life; they express no feelings of consolation or happiness in the prospect of a future existence; they view every thing through a medium of gloom. Many individuals thus affected labour under bodily ailments, to which they generally ascribe a greater part of their sufferings than these ailments can account for: they complain of loss of appetite, a burning heat in the stomach, constipation of the bowels, and dull oppressive pains in the head, accompanied in females with disordered menstruation. The countenance indicates anxiety or dejection; the complexion is pale or sallow; sometimes there is a sense of fulness or oppression in the head, which impedes thought; and a torpor and general lassitude, which deprives the patient of all inclination to bodily exercise. They never go abroad, but remain, unless compelled to move, moping and silent in their beds or in their chambers; give up their usual employments; neglect their domestic and social duties; be-

come indifferent towards the objects of their most tender affections; dislike society and the intercourse even of their nearest friends; complain of their own incompetency to exertion and to fulfil the duties of life; and appear to feel existence itself an intolerable burden—a state of mind which indicates danger of a termination by suicide. We have seen several individuals affected with the symptoms above described which have lasted for months, sometimes for years, and have then disappeared entirely for a considerable time, but have returned at intervals without any discoverable cause. In some the intermediate space of time has been passed in perfect health; the person affected has performed all his duties with the same energy and good spirits as before the first attack. In others the period of depression has alternated with one of unusual excitement.

So long as this disordered state of mind is accompanied by no illusion, while there is no *unreason*, the patient labours under a form of moral insanity which may be termed simple melancholy. When after long brooding over the sources of distress, and indulging the imagination in trains of thought which are in harmony with the temper of the mind, some illusory phantom has impressed itself upon the belief, the disorder must be considered as having passed into monomania.

III. MONOMANIA.

Partial insanity was until lately termed melancholia, an expression which originated from a hypothetical notion respecting the cause of the disease. It was defined to be a form of insanity in which a single false notion is impressed on the understanding, the mind being otherwise unclouded, so that the insane person is still capable of reasoning correctly though on false premises. As partial insanity is not always of a sorrowful or melancholy character, Esquirol has proposed the term monomania as a designation for those forms of the disease to which the description particularly applies, and this expression has got into general use. I shall adopt it as a designation for those cases of insanity in which the patient is coherent and capable of conversing and reasoning on most subjects, but labours under some particular illusion or hallucination, and as comprehending instances, not only of cheerful illusion but also those attended with sorrowful dejection. The latter are still classed by some under the head of melancholia, for which M. Esquirol substitutes “*lypomania*,” meaning madness attended with grief; but as the same essential character belongs to both kinds, I see no reason for separating them.

M. Esquirol, in his late excellent work on insanity, gives some reasons for including cases of moral insanity under the head of monomania. With great deference to this justly celebrated physician we venture to observe, that the term monomania does not appear applicable to a disorder which is not characterised by any particular error or delusion, but involves a perversion of the whole moral character of the individual, his affections, sentiments, feelings, inclinations, and which displays itself in a change of all his usual habits. We may likewise remark, that if moral insanity really exists, it is expedient that it should be distinctly recognised, and that the fact should be generally proved, that a form of mental derangement is occasionally found, in which, though the understanding is impressed with no erroneous conviction, the state of the individual may yet require some prudential interference.

Cases are on record which fully correspond with the psychological definition of monomania. Individuals who have continued to display great ability and aptitude in all affairs and in the business connected with their professions, who have conducted themselves with propriety in all the relations of life, have yet been known to labour under some insane illusion, like the madman of Argos, who, when he used to see visionary performances in a theatre, was yet “*comis in uxorem, posset qui ignoscere servis*.” One of the most remarkable instances of this description was that of Baron Swedenborg, who is said to have held an official appointment under the Swedish sovereign, the duties of

which he continued to perform, though labouring under an illusory notion that he ever and anon saw and conversed with prophets and kings of the Old Testament, or with the saints and apostles of the New.

Cases which answer so fully to the definition of monomania are however extremely rare; generally the mind is otherwise disordered and weakened, though the characteristic illusion is always the most striking phenomenon; the moral affections and feelings are likewise in a perverted state. Some ruling passion seems to have entire possession of the mind, and the hallucination is in harmony with it, and seems to have had its origin in the intense excitement of the predominant feeling: this is always a selfish desire or apprehension, and the illusory ideas relate to the personal state and circumstances of the individual. M. Leuret terms monomania *le délire des passions*. This excellent writer has given the details of several cases which strongly exemplify the preceding remark, and which should be read by those who are desirous of studying the nature of monomania.

The particular desire or aversion which occupies the mind seems to excite the imagination to such a pitch, that a fantastical idea at length takes hold of the belief. The illusory notions are often vague and fluctuating, but have relation to the same sentiment. Those who fancy themselves persons of great distinction often change their titles, — a king to-day is an emperor to-morrow: the subjects of dread which the melancholic contemplates are not always the same. The misanthrope who has sustained injuries from all his friends, complains perpetually of new grievances; the affronts which he imagines to-day that he has suffered, are not those of yesterday. It is by dint of brooding over the imaginary wrong that he fixes it in his mind, and ultimately in his belief. "Monomania," says M. Esquirol, "is, in its ground-work, a disorder of the feelings: the study of this affection is inseparable from the knowledge of our passions: it is in the heart that it has its real seat, and there we must study to discover the hidden cause and its different aspects and varieties. How many cases of monomania are produced by disappointments in love, by fear, by vanity, by wounded self-love, or mortified ambition? This disorder manifests all the phenomena which characterise the passions; the madness of the monomaniac is exclusive, fixed, and permanent, like the idea which occupies the mind absorbed by some strong emotion."

The last-mentioned writer, in his recent work on mental alienation, has made some excellent observations on the nature of monomania. "It has long ago been said, that insanity is the disease of civilisation: this might have been observed with truth in regard to monomania; indeed, monomania increases in proportion to the advancement of civilisation; it borrows its character from the different stages of society: it is superstitious and erotic in the infancy of society, as it still is in countries where civilisation has made little progress; while, in a more cultivated period, it takes its character from pride, scepticism, ambition, the passion of gaming, despair, suicide. There has been no epoch which has not been remarkable for instances of monomania impressed with the intellectual and moral character of the particular period."

The condition of modern society, as M. Esquirol remarks, has modified the causes and the characters of monomania; and this disease returns under new forms. With the weakening of religious convictions, demonomania and superstitious madness have disappeared. The influence of religion over the conduct of the people being weakened, in order to keep men in obedience governments have had recourse to police, since which time it is the police which haunts weak imaginations. Asylums are filled with monomaniacs who, fearing this authority, have gone mad upon the subject, and believe that they are constantly pursued. The same monomaniac who formerly would have gone mad upon magic, witchcraft, or hell, raves now upon being threatened, pursued, and imprisoned, by the agents of the police. The political convulsions of France produced a great number of monomaniacs, excited and characterised by the events which singularised each epoch of the revolution. In 1791 there

was at Versailles a prodigious number of suicides. Pinel relates, that an enthusiastic admirer of Danton having heard him accused, became mad, and was sent to Bicêtre. The death of the king and his unfortunate family created a great number of monomaniacs: the trial of Moreau, the death of the Duke d'Enghien caused many. When the pope came into France, religious ideas were excited; and there were a number of superstitious maniacs, who disappeared after a time. At the period when the emperor peopled Europe with new kings there were in France numerous monomaniacs, who fancied themselves emperors or kings, empresses or queens. The war in Spain, the conscription, conquests, and defeats, produced their peculiar mental diseases. It is a fact, that there are in different lunatic asylums many individuals who believe themselves to be the dauphin of France, and destined to the throne. Every observation confirms the fact, that the state of society exercises a great influence upon the production and character of monomania.

Melancholia, or that variety of partial insanity in which the predominant sentiment is grief and despondency—a sentiment which conjures up corresponding ideas and illusions, though it comes within the same general definition—is a strongly marked, and, in many respects, a very different disorder from the cheerful madness of the lively monomaniac. The external aspect of the melancholic is striking, and symptomatic of his mental state. He is generally thin and emaciated, with a pale sallow complexion, sometimes a red patch on the cheek, or the tip of the nose; the hair is often straight and black, the skin cold and clammy, the look fixed and motionless, turned towards the ground, or gazing as if into distant space, expressing absence of thought, or sometimes by quiet and furtive glances indicating that suspicion or fear is uppermost in the mind. M. Esquirol has described this disorder in the most graphical manner.

The concentration of feelings and thoughts renders the actions of the melancholic uniform and slow; he dislikes all kinds of motion, passes his days in solitude and idleness; he sits habitually with his hands crossed, or if erect, inactive, with his arms hanging down; if he walks, it is with slowness and apprehension, as if he had some danger to avoid, or else he walks with precipitation, and always in the same direction, as if his mind was deeply engaged. There are some who tear their hands, the extremities of the fingers, and destroy the nails. Tormented by grief or fear, the ear and eye constantly on the watch, the lypemaniac, says M. Esquirol, has no rest by day, nor sleep by night. The secretions are scanty or suppressed.

Some melancholics obstinately refuse all kinds of nourishment; some have been known to have passed many days without eating although very hungry, prevented by hallucinations and illusions which produced chimerical fears. One dreads poison, another dishonour; one wishes to do penance, while another thinks that if he eats he brings his relatives or friends into difficulty; and there are some who hope to get rid of life and their torments, by abstaining from all nourishment. A lunatic has sustained abstinence during thirteen and twenty days, and longer. When the repugnance to eat has been overcome, most melancholics are less sorrowful and dejected.

The pulse is generally slow and weak: sometimes it is very hard, and a kind of trembling of the artery is felt under the finger; the skin is arid, of a dry heat, and often burning. Melancholics seldom sleep; restlessness, fear, terror, jealousy, and hallucinations, keep them awake; if they become drowsy, as soon as their eyes are shut they see a thousand phantoms which terrify them; if they sleep, their rest is interrupted and agitated by dreams. Sometimes they awake, starting up with the nightmare, or from dreams which have brought before them the objects which have caused or kept up their delirium. Many, after a good night, are more melancholy and restless; some believe that they never shall get to the end of the day, and are better as night approaches; while others feel their restlessness increase towards night—they dread darkness and solitude, fear lying awake, or the terrors accompanying sleep.

The secretions present remarkable disorders in melancholics: the urine is abundant, clear, and limpid; sometimes it is scanty and turbid. Some melancholics, for various motives, retain their urine for several days. The case is related of a patient who would not pass his water, fearing to deluge the world, and who was at length only prevailed upon to do so in order to extinguish a fire that was raised on purpose.

M. Esquirol has observed that melancholia presents in the assemblage of symptoms two well-marked distinctions. Some lypemaniacs are very irritable and extremely excitable; every thing makes a most lively impression upon them; the slightest causes produce the most painful effects; the most ordinary and simple events appear to them new and singular phenomena, ordained expressly to torment and injure them. Cold, heat, rain, wind, affect them with horror and grief; noises distress, and make them tremble; if any thing displeases them, they repulse it with rudeness and obstinacy; if their food is not what they relish, their repugnance often causes nausea and vomitings. All their feelings, thoughts, and actions, are forced and exaggerated. This extreme susceptibility causes them to be continually meeting with fresh objects and occasions of distress; thus, both day and night, they are constantly on the watch; they are always in motion, in search of their enemies and the cause of their sufferings; and they relate to every person who comes in their way their misfortunes, fears, and despair. Sometimes the mind is so absorbed in one single idea, that sensation seems to have abandoned the bodily organs; the body is incapable of any impression; and this one subject absorbs the attention, and suspends the exercise, of all the intellectual functions.

The motionless state of the body, the rigidity of the features, obstinate silence, betrays the deplorable state of the intellect and the affections.

In this state of distressing excitement of feelings, melancholics are not only inaccessible to every impression foreign to the object of their delusion, but they are also quite unreasonable, because they receive false impressions. An abyss separates them, they say, from the exterior world. "I hear, I see, I feel," some melancholics have said, "but I am not as I formerly was; objects do not come to me; they do not identify themselves with my being; a thick cloud, a veil, changes the colour and the aspect of bodies; the most polished surfaces appear to me rough with bristles," &c. External objects not having their natural relation, distress, astonish, and alarm them. They have illusions of the senses—hallucinations; they associate together ideas the most dissimilar and most absurd; and hence spring convictions more or less contrary to common sense, unjust prejudices, fear, horror, or grief.

The feelings modify the ideas, the hopes, the determinations, of the most sensible men. Melancholy feelings thus affect a partial lesion of the understanding. The whole intellectual life of a person suffering under melancholy delirium, is impressed with the character of his feelings. The mountaineer cannot bear to be absent from the place which gave him birth; he pines away and dies, unless he is restored to his paternal soil. A person who fears the pursuits of justice, alarmed and terrified, dreading to be arrested every instant, fancies he is surrounded by agents of police, and even sees them among his friends and relations.

IV. OF INSTINCTIVE MADNESS, OR INSANE IMPULSE.

It has been truly observed by Esquirol, that the disorder which Pinel described under the epithet of *Manie sans délire*, and which is here termed instinctive madness, or insane impulse, is in some respects a different affection from that which has been designated moral insanity. It may be considered as a variety of moral insanity, but it is very distinct from the disorder of the feelings and moral affections above described, as pervading the whole mind and perverting the moral character of the individual. In this instinctive madness the understanding is unclouded, as it is in moral insanity: there is no hallucination or illusion; but in the former

state it has not been observed, that the affections and moral sentiments and the feelings are universally in that intense exaltation which belongs to most cases of moral insanity. The will is occasionally under the influence of a disordered impulse, which suddenly drives the person affected to the perpetration of acts of the most revolting kind, and to the commission of what he has no motive. This impulse is instinctive; it is irresistible; and its gratification is unaccompanied for the most part by any organic or mental pleasure: it is unlike the gratification of physical appetites, and equally unlike that of hatred and revenge. Individuals who have felt the approaches of this disorder have been known to take precautions against themselves; they have warned their wives and children to escape from within their reach till the paroxysm shall have subsided.

1. *Homicidal Impulse.* Among the varieties of insane impulse there is none that better characterises the nature of this deplorable affection than the homicidal impulse. It was first described by Pinel, and considered by him to be (as now generally admitted) an instinctive impulse without delirium. M. Esquirol in the *Dictionnaire des Sciences Médicales*, art. MANIE, attempted a different explanation of the cases supposed to be of this description, which at that time were known to have occurred. In his late work (*Traité sur l'Aliénation*), and previously in a dissertation appended to the translation of Hoffbauer's *Psychologie in ihren Hauptanwendungen auf Rechtspflege*, this writer has very candidly admitted that he has been brought, by the cogent evidence of facts, to a different opinion. He now declares that numerous and well-authenticated cases have demonstrated the fact, that while some madmen commit homicide under the influence of delirium or of illusions, while others perpetrate similar acts with premeditation and design, influenced by an intense feeling of malevolence, which may be a part of the general perversion of their moral feelings, there is a third class who are neither under illusion nor moral perversion, if we inquire into the general state of their affections and moral feelings, and who are driven to commit homicide by a sudden and merely blind and instinctive impulse, without motive, without consciousness of the nature of the act. The following instances are related by M. Esquirol in his late work:—“A female, ten days after her delivery, felt herself all at once, and without any motive, agitated with the desire of cutting her infant's throat. The mother of four children is involuntarily impelled to destroy them, and the only way of escaping such a misfortune is by deserting her house. A nursemaid was seized with an irresistible desire to rip open the infant committed to her care every time she undressed it to put it to bed. A mother attempts to cut the throats of those of her children whom she loves with the greatest tenderness. A female at the period of menstruation experiences the desire of killing her husband and her children, and the desire is strongest when she sees them asleep. A gentleman read a newspaper in which were related the details of a murder of a child; the next night he awoke, starting from his sleep, with the intent to kill his wife. A female who cut off the head of a neighbour's child was brought to judgment; the trial was very much talked of, and produced in imitation a great number of homicidal attempts without delirium. In this last series of facts the intellect, moral affections, and the will, are annihilated. What then is this terrible disease, which, mocking the sweetest feelings of existence, drives a man to the violation of the most sacred laws of nature, and impels him to kill his fellow-creature—to destroy the persons dearest to him. The miserable victim of disease does not attempt to reason before he commits the murder, and at the time he is not actuated by any passion or by any motive, but is instinctively driven to the commission of the crime. A husband kills a wife whom he tenderly loves, a father the son that is most dear to him, and a mother her nursing babe. This phenomenon could not take place without admitting the total suspension of all intelligence, of all moral sensibility, and of all will. The following is a good illustration:—A gentleman, thirty-two years of age, tall, rather thin, of a nervous temperament, and amiable character, had received a good edu-

cation, and cultivated the arts; he had been ill with a cerebral affection, but had been recovered from it for some months. He went to Paris, and for two months conducted himself in the most regular manner. One day he went to the Palais de Justice, and entering into the hall of the Pas Perdue, he threw himself upon a lawyer and seized him by the throat; he was arrested, and conducted to prison, and committed to my care the very day of the event. On my first visit, the next day, he was calm, tranquil, without anger or resentment, and had slept well all night; and the same day he painted a portrait. He recollected perfectly well what had happened the evening before at the Palais de Justice, and spoke of it with great coolness; but he had no recollection of the motives nor the circumstances of his action, and felt no regret for it: he replied to my questions with politeness, without dissimulation, and with the accent of truth. 'I went to the Palais de Justice as I might have gone any where else, to the Palais Royal or the Tuilleries, without plan or intention; and so far from having any resentment towards the lawyer, he was perfectly unknown to me, and I never had any kind of business with any lawyer, and I cannot explain how such a disaster could have happened; it might have taken place any where else, and I might have seized upon any other individual.' On my observing to him, that a sudden attack of disease might explain this action, 'You may explain it as you like,' he replied; 'I do not feel ill; nor can I give any reason for the event.' During three months which this gentleman passed under my care, he was never insane for an instant, never delirious, and never committed an absurd action; he was polite, obliging to every-body, amused himself with painting and reading serious books."

Many facts might be collected which sufficiently prove the connection of this formidable mental disorder with physical conditions, or with a morbid state of the bodily constitution. Among these is the circumstance, that such insane impulses have been noted as occurring in persons subject to epilepsy. One case has been recorded by Pinel, in which the homicidal propensity was observed to break out after symptoms of gastric disorder. Nasse and other writers have mentioned facts, which indicate that a similar excitement is particularly incident to persons who labour under hypertrophy of the heart: the connection of the phenomena is in this last instance easy to be understood. M. Esquirol has given a remarkable case in illustration of the dependence of instinctive madness on congestion in the brain.

2. *Insane Impulse to burn (Pyromanie of M. Marc).* Another form of instinctive madness is the impulse to burn or set fire to houses, churches, beds, &c. So many instances of this description have occurred, that the disorder has received a distinctive name, that of pyromania, given by M. Marc, who first wrote on the subject. Two or three cases of this kind are alluded to in the writer's *Treatise on Insanity*.

Arson, as it is termed, has been perpetrated by lunatics labouring under illusion, who fancied themselves commissioned by an angel, or to have received a divine command. Such was the man who burnt the Minster at York. These are not cases of the description now considered. The conclusion of M. Esquirol, who has examined the evidence of facts bearing on this subject, is as follows:—"Among incendiaries who are insane, or whose minds are weakened, some have hallucinations; but the greater part obey an impulse more or less strong, and are hurried on by motives more or less plausible: but these patients are not deprived of the faculty of reasoning. There are facts which show that some incendiaries are moved by an instinctive impulse, independent of their will. And it is this fact which places this last variety in the *manie sans délire* of Pinel, and which I call *monomanie sans délire*, because the action of burning is neither the result of passion, nor of delirium, nor of want of reason."

The connection of this disorder of propensity with corporeal derangement is illustrated by a case recorded by the same writer, in which a strong incendiary impulse appeared to be the consequence of epilepsy, or to have been connected with that disorder.

3. *Suicide.* The propensity to self-destruction is another phenomenon, which in some instances belongs to the class of morbid affections now under consideration, namely, to that of instinctive impulses; in which it would almost appear that volition takes place without motive, or at least without deliberation. It must however be admitted, that suicide is often connected with other forms of insanity. M. Falret, who has written an able and very celebrated work on suicide, has perhaps erred in treating it as one distinct and specific form of insanity. We shall find reason to conclude that suicide is caused by various morbid states of the mind, or by different modifications of mental derangement. But is suicide always the result of insanity in some one of its modifications? Some have maintained the affirmative. A perversion of the strongest instinct, or active principle impressed on the mind, that of self-preservation, seems to be so great a deviation from the natural state of the feelings and of human desires, that it would imply something nearly bordering on insanity. Nevertheless, it must be admitted, that suicide has often been perpetrated by persons who cannot be considered to have been, in any proper sense of the word, insane. How many persons destroy themselves under the influence of enthusiasm, or some false religion, as in the processions of the Hindoos, where four or five hundred fanatics are often crushed under the wheels of the car of Juggernaut in a single festival. At Rome, as every one knows, suicide was the general consequence, among the nobles, of falling under the displeasure of the emperor; and in China*, no mandarin or public officer who falls into disgrace, thinks of any other termination of his career. At Ceos, the country of Simonides, it was the custom to commit suicide when any man attained the age of sixty years, and it was deemed shameful to survive the period which rendered him unable to serve his country and the commonwealth. These and similar facts are sufficient to prove, that suicide exists independently of mental disease, and as the result of moral causes which exert their influence on the whole community. The same inference arises from the history of particular cases of suicide, in which it appears that the act has been sometimes premeditated, and the result of motives well-weighed — of moral determination of the will; and at others has been committed under the influence of some strong passion or motive, which although it may have perverted the understanding, or have deprived reason of its due influence over the mind, as other violent passions are apt to do, is yet not to be confounded with insanity. The same inference arises from cases, of which there are many on record, of suicide committed by more than one individual conjointly, and with a similar and common purpose. Two or more persons cannot be supposed to have been seized at the same moment with a similar insane impulse.

Cases of suicide depending on insanity may be referred to three divisions, in each of which the nature of the action in a psychological point of view is different from that of other forms.

(a) Suicide takes place in cases of suicidal melancholy without illusion or any erroneous notion. We have known instances in which persons who had shown no other indication of mental derangement than gloom, taciturnity, or continual expressions of grief, distress, and inward misery, at length destroy themselves by shooting themselves, or jumping out of a window. In these individuals there was no *unreason*. They must have known the moral nature of the act committed by them. Their disorder was merely one of the feelings and sentiments, and left the understanding unimpaired. Many have sunk into this state, while all the circumstances of their outward state were such as are most likely to make life happy and desirable.

Suicide under such conditions has been committed generally by persons whose education has been faulty, whose minds have been agitated by violent

* See the translations of Chinese plays in Duhalde, in which the frequency of suicide is quite ridiculous.

passions, or wholly engrossed by worldly pursuits, and broken by disappointments; never by those who have obtained the consolations of religion.

(b) Suicide is in many instances a result of some morbid illusion. These cases belong to monomania with melancholy dejection; and they illustrate strongly the nature of that disease, in the power which the illusory idea exercises over the mind, the obstinate adhesion with which the lunatic holds to his morbid persuasion and unhappy resolve, and his indifference to the sufferings which he experiences in the accomplishment of his purpose.

(c) None of the cases of suicide above noted come properly within the description of instinctive madness or insane impulse, or excited propensity to certain acts without motive or design. None of the acts of self-destruction which originate from the states of mind referrible to melancholy dejection, either with or without illusion, will bear a comparison with the acts of homicide described in the preceding pages; but there are other cases of suicide, which appear to be strictly analogous to those of instinctive homicide. This remark most obviously applies to cases of suicide accompanied, or immediately preceded, by homicide, of which many have been reported on unquestionable authority. Persons apparently in sound health, both of body and mind, have been seized, as if possessed by an evil spirit, with an unaccountable impulse to destroy some of their friends or relatives, and at the same time themselves. A lady whose case was reported in the public journals in 1835, after having thrown four of her children into a well, jumped into it. She had previously sent a poisoned cake to another child who was absent. M. Falret and other writers have reported a number of cases in which these strange and horrible propensities were developed simultaneously, and which leave no room for doubt as to the psychological character of either action.

Instances have occurred in which persons, occupied with the desire of self-destruction, or longing for death, have committed homicide in order to obtain their end without dying by their own hands. Dreading the guilt of suicide, or rather the punishment which they believed to be its consequence in a future life, they have committed murder in the hope of obtaining absolution previously to their death by the hands of the executioner. Such instances cannot be numerous, since they imply conditions which are not often found in combination.

Various as are the states of mental disorder which precede suicide, there are yet so many physical conditions with which it is connected, as to establish the conclusion, that it often depends on disease, or on physical states of the constitution, and even afford some countenance to the opinion maintained by M. Falret, that it is a specific mental disorder on the manifestation of one.

Suicide is often connected with bodily disease, manifested either during life, or by necroscopy.

It is well-known that some females have displayed a strong propensity to suicide at the periods of the catamenia. Individuals who have manifested this propensity are known to have laboured under hypochondriacal and dyspeptic symptoms, cardialgia, flatulent or neuralgic pains in the bowels: they are generally of the melancholic or atrabilious temperament, or display the external appearances of the constitution, which is designated by that term, which appearances indicate a certain morbid state described in medical works. The general state of health is seldom unimpaired in persons who make attempts to destroy themselves. It is well-known that the *pellagre* endemical to Lombardy, a disease affecting primarily the digestive organs, and displaying its external effects on the skin, gives rise to a strong propension to suicide. M. Esquirol was assured by Professor Tomassini, that one third at the least of the persons affected with this disease commit suicide; and some Italian physicians affirmed the proportion to reach to one half.

Necroscopy has displayed a variety of phenomena in the bodies of persons who have been the victims of suicide. And although these phenomena are not constant, the frequent discovery of some or others of them in such bodies indicates their connection with the propensity displayed.

In the head we usually look, in the first place, for phenomena connected with forms of mental derangement. Gall was of opinion that the skulls of self-murderers are thick and dense. Esquirol declares that he possesses in his collection many skulls which are negative of this opinion. "I have sought," says this excellent observer, "in many heads to find some general fact in the proportions of the different diameters, and could obtain no result. I possess skulls of suicides, of which the antero-posterior diameter is very long, while in others this diameter is nearly equal to the lateral one; so that in one case the head was very long, and in the other almost spherical." There is nothing constant in the phenomena presented by the brain in these cases, either in respect to original conformation, or the marks of internal and supervening disorganisation.

Osiander regarded lesions of the heart and inflammations of the abdominal viscera as the causes of suicide. Disorders of the heart have been found frequently by Alberti of Göttingen, and by Corvisart. M. Esquirol has found the transverse colon out of its natural position, and lying in a perpendicular direction towards the pubis, a phenomenon noted in other modifications of insanity. This writer concludes that there is nothing constant or uniform in the phenomena of suicide in necroscopy. The same conclusion was obtained by M. Leuret as the result of sixteen dissections. (*Dict. de Méd. et Chir. Prat.*, art. SUICIDE.)

The predisposing and occasional causes of suicide indicate the connection of this propensity with physical conditions. Those who have committed suicide, according to universal testimony, have generally been members of families predisposed to insanity. Dr. Rush has reported a remarkable case coinciding with this series of observations. Two young officers who distinguished themselves in the revolutionary war of America were twins: they were so much alike, that few persons could distinguish them: both were of cheerful dispositions, and happy in their families, connections, and fortune. Both committed suicide about the same period, when they were in different parts of the country: they had been dejected for some days before. The mother of these young men was insane; and two of their sisters were for some years harassed by temptations to suicide.*

The influence of season is perceptible in the frequency of suicide. It is a vulgar opinion that the gloomy months of autumn give rise to the depression of spirits which foster this propensity. This is an error. The effect of season is entirely physical, since in the hottest and brightest months of the year suicide chiefly occurs. This general fact has been established by the averages of Fodéré and Duglas at Marseilles, and by the observations of Dupuytren and M. Esquirol at Paris. The writer last mentioned found the number of suicidal attempts in the Salpêtrière during six years as follows:—In the winter, trimestre of January, 42; spring, trimestre of April, 58; summer, trimestre of July, 61; autumn, trimestre of October, 31; making 73 cases in the winter and autumn, and 119 in the spring and summer. In hot seasons they are most frequent. This was observed at Mansfield by Sydenham long ago, and recently at Stuttgart, at Rouen, and in the Valais.

Suicide has been committed more frequently by males than by females, in the proportion of three to one; and the most numerous cases have occurred between the ages of twenty and thirty.

The preceding summary contains the principal facts known in relation to suicide. It is evident that this horrible catastrophe is the result of various causes: sometimes of national customs, erroneous notions, and of imitation: in other instances it is a deliberate act, in which the will, according to the ordinary laws of human action, is influenced by motives, and is determined after deliberation: in some cases it results from moral dejection and tedium of life, which may be considered as a form of moral insanity: in another class of instances insane illusion has perverted the understanding; and, lastly, it is some-

* Medical Inquiries and Observations upon Diseases of the Mind. Philadelphia, 1812. Esquirol, sur l'Aliénation, tom. i. p. 580.

times the result of an immediate and spontaneous impulse, analogous to that which produces the most fearful and appalling cases of homicide. Physical circumstances, however, give a predisposition to the act in most of these examples.

4. Some other manifestations of morbid propensity are occasionally observed, which appear to be, in the nature of that deviation from the healthy state which they display, analogous to the facts above described. As the recognition of these is important in a medico-legal point of view, we shall briefly describe, or allude to, them.

Instances of a propensity to steal which was wholly irresistible, are said to have occurred. "There are persons," says Dr. Rush, "who are moral to the highest degree as to certain duties, but who nevertheless lie under the influence of some one vice. In one instance a woman was exemplary in her obedience to every command of the moral law except one—she could not refrain from stealing. What made this vice more remarkable was, that she was in easy circumstances, and not addicted to extravagance in any thing. Such was the propensity to this vice, that when she could lay her hands on nothing more valuable, she would often at the table of a friend fill her pockets secretly with bread. She both confessed and lamented her crime." What is most to our purpose is the fact, that this propensity is proved to be depending on a morbid state of the brain. In the first place it is connected with other indications of insanity; it sometimes follows and sometimes precedes, at others accompanies mania. Pinel says, "It is a matter of common observation, that persons who in their lucid intervals are considered models of probity, yet cannot during the paroxysm refrain from stealing and cheating." Fodéré relates the case of a female servant in his own family, who could not help stealing secretly from himself and others articles even of trifling value, though she was intelligent, modest, and religious; and was all the while conscious of, and admitted the turpitude of her actions. He placed her in a hospital considering her insane, and after apparent restoration, and a long trial, he again took her into his service. Gradually, in spite of herself, the instinct again mastered her; and, in the midst of an incessant struggle between her vicious propensity on the one hand, and a conscientious horror of her condition on the other, she was suddenly attacked with mania, and died in one of its paroxysms. Injuries of the head, which often occasion mental derangement under other forms, also give rise to this particular symptom, which is occasionally an insulated one. Acrel, who is cited by Ray, mentions the case of a young man, who, after receiving a severe wound on the temple for which he was trepanned, manifested an invincible propensity to steal, which was quite contrary to his ordinary disposition. After committing several larcenies he was imprisoned, and would have been punished according to law, had not Acrel declared him insane, and attributed his unfortunate propensity to a disorder of the brain.

Abnormal erotic propensities have given rise to a series of phenomena in human actions which have been considered to belong to the province of the moralist, or the enactor of penal chastisement, rather than to that of the medical philosopher. That this opinion has been founded in error we are fully convinced; and we doubt not that the time will come, when the very names of many offences against decorum, now considered as punishable crimes, will be erased from the statute-book; and when persons now liable to be sentenced to the pillory or the gallows, will be treated as lunatics. It would be superfluous to enlarge upon this topic, which belongs to jurisprudence rather than to a practical work like the present. The public are not yet prepared for entering upon it without prejudice.

Progress and terminations. Insanity, as it is well-known, is either continued, or intermittent and recurrent.

It is the opinion of M. Esquirol, who has devoted his attention perhaps longer and more closely than any other individual living to the phenomena of insanity, that attacks of continued madness have regular stages of progress, which

are in general perceptible and distinctly marked : the first is an acute period, with concomitant symptoms of disorder in the physical health, the second one of chronic or persisting madness, exempt, for the most part, from any such symptoms ; and the third is the period of decline in the disease, and of approaching recovery.

Intermittent or recurrent madness has very various intervals, and these are sometimes regular and at other times irregular. The same season of the year, the same moral or physical causes produce a return of mental derangement of a similar kind and duration as the preceding attack. More frequently the recurrence is at various periods, and the form of madness changes at successive renewals of derangement. The returns of disease are sometimes announced by headach, want of sleep, loss of appetite, or by voracity, constipation, pains in the bowels : some patients experience vivid dreams, presentiments, excitement of the imagination ; they display excessive loquacity, great bodily restlessness and activity.

Madness is complicated with various cerebral disorders, such as paralysis, convulsions, epilepsy, hypochondriasis, and hysteria. Such complications greatly affect the prognosis. M. Esquirol maintains the doctrine of critical terminations of madness, and gives a variety of examples to show, that the disease has ceased speedily on the supervision of other diseases, on sudden spontaneous evacuations of different kinds.

According to the results obtained by the same writer from a comparison of various dates, it appears that the absolute number of complete recoveries in cases of insanity is about one in 3, and varies from one in 4 to one in 2, the difference depending on the circumstances connected with various establishments, such as their local situation, the nature of the cases admissible into them respectively, and the treatment to which the patients are subjected. In the treatise on insanity before cited, statements have been collected from a considerable number of hospitals for lunatics, proving that many of the returns from establishments in England afford a more favourable result than that which M. Esquirol has obtained in France. Thus, in the Retreat near York it appears, that of 334 cases admitted 168 have terminated in recovery ; in the county asylum at Gloucester the proportion of recoveries, without taking into account a considerable number which afterwards took place among those dismissed as relieved and on trial, is here very great, viz. 234 in 516, which approaches nearly to one half of the total number admitted — a circumstance the more striking as no selection is used in the admission, lunatics of all descriptions being reckoned fit objects to receive the benefits resulting from this excellent establishment.

The prognosis is much less favourable in cases of insanity complicated with other diseases of the brain, and is almost uniformly unfortunate when epilepsy and paralysis coexist with mental derangement. The paralysis of the insane is of a peculiar character. It is in fact a disease distinct in its phenomena from other modifications of paralysis, which was not known to medical observers until it was described by Esquirol and Calmiel. The first symptoms of this deplorable disease are perceptible in imperfect articulation or muffled speech ; by and bye a tottering vacillating gait announces that it has reached the nerves of the lower extremities ; all locomotive power is afterwards lost, and the patient perishes within a year or two from the commencement of the paralysed state, after losing successively all the powers of animal life.

The period of the disease is of the greatest importance in regard to prognosis. Out of 2005 cases considered as curable ones in the Salpêtrière we are informed by M. Esquirol that 604 were cured in the first year, 497 in the second, 86 in the third, and 41 in the seven succeeding years. Hence it is concluded, that the mean duration of cases of insanity, which terminate in recovery, is short of one year ; and that, after the third year, the probability of cure is scarcely more than that of one in 30. However, there is perhaps no period the length of which renders recovery entirely hopeless. Pinel and Esquirol

have given statements, from which we learn that this event has taken place after the disease has lasted twenty-three or even twenty-five years; and if it can happen after the disease has continued so long, there can be no reason for asserting it to be impossible after any period.

Age occasions some difference in the prognosis: from twenty-five to thirty is the period of life at which the greatest number of recoveries has taken place. From the forty-fifth year to the end of life the probability of recovery gradually diminishes.

Sex is also a circumstance to be taken into the account. According to the researches of Esquirol, a greater number of females than of males recover.

Anatomical characters. As insanity, uncomplicated with other diseases, is not fatal in any great proportion of cases, maniacs generally fall victims to complaints remotely, or not at all, connected with mental derangement. Some live to an advanced age, and wear out the vitality of the bodily fabric just like those who have retained their reason to the last moments of life. "Maniacs," says M. Esquirol, "do not die in consequence of the cerebral affection which was the immediate cause of insanity. They perish "in typhoid or ataxico-cerebral fevers, phthisis pulmonalis, epilepsiform convulsions, and accidental complaints." Dissection displays the phenomena connected with these adventitious disorders, and very many of these phenomena have been mistaken for the causes of insanity. Maniacs who have died accidentally, have furnished no indications of disease. M. Esquirol says, "We had at the Salpêtrière a young woman, twenty-four years of age, who was in a state of recent furious madness, free from all complication of disease: she was killed by one of her companions. The pupils who assisted at the opening of the body were equally surprised with myself not to find any lesion of the brain, or of the meninges." It happens that the brain and the meninges are without lesion, although patients have lived maniacs for many years. The nature, the extent, and the seat of the lesions, is not in accordance with the violence and duration of the delirium. When authors have met with lesions of the brain, or of the membranes, they have observed during life an irregularity in the powers of motion, paralysis, or convulsions. If we were to follow with attention the steps of the disease, we might, by the symptoms which soon become complicated, assign the exact period at which such lesion begins. On the other hand, how many organic lesions of the brain, or of the meninges, have escaped the most attentive observation? When a long-continued mania exists, even to the last hours of life, may not a general weakness dispose to local inflammation? May not the symptoms of meningitis, of sanguineous congestion, of cephalitis, and of encephalitic lesions, that are observed on the opening of a body, belong to the epiphenomena which precede death? Has any one taken the pains to distinguish the phenomena which belong to simple, from those of complicated, insanity? It is certain that there have been maniacs in whom no cerebral lesion has been found. Some insane persons are suddenly cured; others live ten, twenty, or thirty years, notwithstanding the organic lesion of one of the organs most essential to life. Fits of intermitting madness cease spontaneously. To what conclusion do we then arrive? that pathological anatomy, notwithstanding the very important works of MM. Foville, Calmiel, Bayle, and Guislain, has not yet made us acquainted with the organic cause of madness. Thirty years ago I would willingly have written upon the pathological cause of insanity; I would not now attempt so difficult a task, there is still so much uncertainty and contradiction in the results of the examination of the bodies of mad persons: but recent researches lead me to hope that more positive, clear, and satisfactory notions may be obtained."

Necroscopical researches into the causes of insanity began with Bonetus and Morgagni. Late writers have accumulated a vast mass of observations on this subject, the principal heads of which will be found in the *Treatise on Insanity*: their researches have been principally directed to the brain and its coverings. M. Esquirol however found, at the Salpêtrière, that secondary organic lesions

of the thoracic and abdominal viscera were the most frequent phenomena discoverable after death. Of 176 females who died of melancholia, the phenomena of pulmonary phthisis were found in the bodies of 62, organic lesions of the heart in 16, the results of chronic inflammation in the abdomen in 32. Only six appeared to have died from disease of the brain, namely, under the symptoms and with the lesions of the encephalon proper to apoplexy. (*Op. cit.*, tom. i. p. 443.) The same writer informs us, on the other hand, that the results of examinations at Charenton afforded a very different result. Morbid changes of the brain and its coverings were in that hospital more frequent than those of the thoracic and abdominal viscera. He attributes the difference in these observations to the fact, that at Charenton the patients are all males, who are much more subject to general paralysis (*paralysie des aliénés*) than females. Here the disorder of madness was complicated with an additional disease, which had its seat and left its vestiges in the encephalon.

M. Georget has summed up the morbid changes which he considered as authentically connected with madness, and his recapitulation may be looked upon as a tolerably complete statement of the result of anatomical researches into this subject up to the time when his work on insanity, and the article contributed by him to the *Dictionnaire de Médecine*, were published. The following are the principal points:—“Irregular conformation of the *cranium*, the prominences of which are developed irregularly, those of the right side being generally larger than those of the left; some skulls having the lateral diameter of equal extent with the antero-posterior, and the cavities of the base irregular in extent; some skulls (one in twenty) thickened partially or generally, more frequently the bones hard, white without diploë, resembling ivory; some very light. *Dura mater* rarely changed; sometimes adherent to the skull, thickened, containing deposits of bone. *Arachnoid* displaying in places additional laminae of a red or grey colour; sometimes thickened, but smooth. *Pia mater* injected or thickened, and infiltrated with serum, giving at first the appearance of gelatinous deposit. *Volume of the brain* sometimes less than the cavity of the cranium seems to require. Some brains very hard, cut with difficulty, the white substance glutinous, elastic, and suffering distension; more frequently the brain is soft, the grey matter being pale and yellowish, and the white substance discoloured, of a dirty white, the colour and consistence of these portions almost confounded. The convolutions separated by serosity, and the *pia mater* thickened. Interior cavities of the brain appearing in some instances very large, in others small, often filled with a serous fluid, remarkably clear and limpid; plexus choroides exsanguineous, containing hydatiform vesicles. Partial softening of the brain, erosions, ulcerations of the surface of the ventricles. *Cerebellum* generally softer than the cerebrum, sometimes partially softened. *Mesocephalon*, *medulla oblongata*, and *medulla spinalis*, rarely displaying morbid changes of structure.”

Considerable additions have been made to the morbid anatomy of the brain in cases of insanity since the time of M. Georget. These researches have been conducted chiefly by MM. Bayle, Calmiel, Lallemand, Foville, and Bouillaud. The two former have principally directed their attention to the history of general paralysis; and the pathological details given by them have reference to this disease, which may be termed an adventitious one; but which is so frequently connected with insanity, that its supervention cannot be looked upon as a matter of mere contingency. M. Calmiel's observations resolve themselves into the general conclusion, that unequivocal signs of chronic inflammation of the brain exist in almost every case of this disease complicated with insanity.

Some of the morbid appearances which M. Calmiel considered as proper to the disease, which he terms *paralysie des aliénés*, are connected by M. Foville with insanity, and are regarded by that writer as ultimate results of that disease in its protracted stage, when the brain having long been disordered in function, and especially in the state of the vascular apparatus, passes into a degree of

disorganisation, no longer compatible with the continued preservation of even physical life. The changes which the different parts of the encephalon undergo, according to M. Foville, resolve themselves into the signs of recent inflammatory action in acute cases, and the well-known results of long-continued inflammation in chronic and inveterate examples of the same disease. He has noted in the former the chief morbid signs in the grey substance of the brain: such are a red colour, uniform, and very intense; numerous mottled spots, varying from a bright to a violet red, bloody points; minute extravasations of blood; diminished consistence in the thickness of the cortical substance, coincident with a slight increase of consistence in its surface; dilatation of the vessels, and resistance of their parietes. In acute cases M. Foville has never observed adhesions of the membranes to the cortical substance. Such adhesions are very frequent in chronic cases; and hence, as he conjectures, may be explained the curable nature of recent maniacal affections, and the hopeless and incurable state of those patients who have long laboured under insanity.

The chronic changes of the cortical substance are, increased firmness and density of the superficial part, extending to no great depth, but uniform, and constituting a distinct lamina or layer of hardened consistence, which, torn off, leaves a red, soft, mammillated bed of softened cortical substance beneath. The volume of the convolutions remains natural, or is less than natural, owing to a real atrophy, or to the existence of lacunæ, which are the results of a minute extravasation. This morbid change often extends to three or four convolutions on each side of the sagittal suture, a chasm filled with serosity, often occupying the place of the absorbed cerebral substance. Coexistent with this state of the encephalon is that species of atrophy of the cranium in which the diploë disappears, leaving a superficial depression on the head. Another morbid state of the cortical substance is that of an uniform and red ramollissement, which is a change very distinguishable from that above described.

The changes of the white substance, principally its preternatural hardness and unusual whiteness, resolve themselves, in M. Foville's opinion, into adhesions between the cerebral fibres and the deposition of additional matter, the results of chronic inflammation. It is well-known to those who have studied the works of late anatomists on the structure of the brain, that M. Foville has attempted to demonstrate in the organisation of the cerebral mass the existence of distinct planes of medullary substance, superimposed one upon another, and connected in the healthy state by means of a very fine cellular tissue. These planes, thus easily separable in the healthy state, become closely adherent in long-continued cases of madness.

M. Foville repeats the observation made by many writers, that the brains of lunatics are so full of serous fluids, that an abundant serosity flows from the surface of incisions. He likewise observes the presence of small serous cavities, from the size of a millet-seed to that of a nut. This was first noted by M. Esquirol. It is the appearance which the late Dr. Sims has more recently described as the spontaneous cure of ramollissement. The section of a brain thus perforated is compared to that of a porous cheese. By M. Foville these cavities are supposed to be the relics of extravasation. Perhaps the opinion of Dr. Sims will be allowed to be the most probable, that they are the results of softenings of the brain.

It must be carefully noted, that these changes in the white substance do not belong to insanity, separately existing and uncomplicated with paralysis. In persons affected with the *paralysie des aliénés*, they are almost universal. They are likewise found in the brains of old men, whose voluntary movements have become uncertain and vacillating, but more in lunatics whose muscular powers had remained unimpaired.

The changes in the membranes observed by M. Foville may be referred, in like manner, to the various results of meningitis: they are thickenings and adhesions of the dura mater, injections of the pia mater, and opacity and increased density of the arachnoid.

The pathological results deduced from these observations are, that morbid changes in the cortical substance are directly connected with intellectual derangement, and those of the white substance with disorders of the motive powers. These opinions coincide generally with those of the most accurate morbid anatomists of recent times. It must be observed, that all such changes in the brain and the membranes resolve themselves into the well-known results of inflammation and increased vascular action.

Diseases in the thorax are often traced in cases of mental derangement. Hypertrophy of the heart is a phenomenon of frequent occurrence. M. Georget declares, that in more than three fourths of the bodies of insane persons examined by him there had existed organic disease of the lungs, such as chronic pneumonia, or phthisical degenerations. He says, that phthisis is the cause of death in more than half of the maniacs who die in the Salpêtrière. Cavernous excavations are found in the lungs of numerous patients, who, during life (unless the fact has been ascertained by auscultation), are never known to labour under pulmonary disease.

Of abdominal diseases in insane persons the most frequent is gastro-enteric inflammation. This has been discovered in a considerable proportion of bodies of persons affected with mental derangement.

One of the most remarkable changes in the necroscopy of insane persons is displacement of the transverse colon. This was observed by M. Esquirol in 33 out of 168 cases of melancholia. The change consisted in an altered position of the intestine, which, instead of traversing the abdomen, was turned into a perpendicular direction, and precipitated behind the pubes. A similar phenomenon has been noticed by Bergmann, Nasse, and Guislain.

Organic diseases of the liver are of very rare occurrence in connection with insanity.

Diagnosis. It is well-known that the diagnosis of insanity is often surrounded with difficulties. Some of them are important with respect to medical jurisprudence; others in a practical point of view. The question whether insanity exists or not, will turn on different considerations, or we must apply our attention to different ways of solving it in the several forms of the disease.

Monomania is the most clearly defined of all the forms of insanity, and the only source of perplexity that occurs, when an attempt to ascertain its presence depends on the difficulty of discovering the actual state of mind of the person supposed to be affected. Monomaniacs generally betray their illusion when questioned in relation to it, or when the subject is mentioned with which it is connected; but there are some who have artifice enough to conceal their morbid impressions, and will evade any question made to them with a view to the discovery, or will even deny what they at the same time believe. This is the fact, especially when they have been repeatedly examined on the points in question, when their replies have led to the continuance of confinement from which they are desirous of being set free. It is on this ground sometimes almost impossible to convince a jury of the real state of a lunatic; and the physician can only convince himself by the testimony of others in whose presence the patient has been less guarded, and by such confirmatory circumstances as repeated opportunities of observing the party may enable him to ascertain.

It will afford much help in these inquiries to be aware of the fact, that persons who labour under illusion are, for the most part, eccentric in their conduct in general, and are morally insane; and that the supervention of some illusory opinion on a previously existent derangement of the habits and moral feelings is the general character of monomania.

The existence of moral insanity is more difficult to determine. The various considerations which must be taken into the account by those who are called upon to decide as to the existence of this form of mental derangement, are summed up in the description of that disease; and we can add nothing to what

is there said, except the remark, that it is unnecessary in legal investigations to go accurately into the question on the negative side. It must be proved before any proceedings against an alleged lunatic can be taken, and before he can be declared of unsound mind, not merely that he labours under a degree of moral insanity, but that his state is individually such as to render him incapable of managing his affairs, and unfit to be entrusted even with the care of his own personal security.

The diagnosis of instinctive madness, or of insane impulse from crime, the object of moral punishment, is a most difficult and at the same time an important investigation. In the *Treatise on Insanity* the grounds on which a decision on this question must in particular cases principally depend are stated, and to that work we must refer for more ample details.

The diagnosis of mania, or of raving madness and delirium, is the only point which remains to be considered.

Mania may be distinguished in general from the delirium of fever by the absence of that typhoid state which accompanies the latter affection. We have seen several patients labouring under febrile delirium who were supposed to be maniacal, through inattention to this simple rule of diagnosis. There are, however, some instances of very acute raving mania, in which, from the violent and long-continued agitation, symptoms supervene which resemble those of fever. The history of the case will generally be sufficient to remove doubt on this subject. Mania, on its first attack, may easily be recognised. The state of the cerebral functions is likewise different. The perceptive faculty is seldom so much impaired in mania as in febrile delirium. Maniacs see, hear, and perceive correctly, although they talk incoherently; their senses are not obtunded or obscured as are those of a patient in febrile delirium; they have not the tremulous agitation and muscular weakness which generally exist in the latter disorder. There are instances, however, in which perception and the muscular powers are unimpaired in delirium, or in which the patient makes at least powerful efforts, and perceives the objects which surround him. A patient in the Bristol Infirmary once jumped suddenly from his bed, being alarmed by a clap of thunder, and sprang up with astonishing strength and agility over the bedsteads in the ward to a window nearly eighteen feet from the ground, from which he made his exit before any body could lay hold of him. He held himself up on the outside of the building by the sill of the window, and was taken down from a great height. He afterwards recovered from his fever, and showed not the slightest symptom of mania. Patients in fever often rave in a way which indicates that they are under illusion as to the places where they are, and mistake the persons who surround them. An apprehension is often entertained by their relatives that they are maniacal; but the history of the case, and an attention to the preceding remarks on the different states of the sensorium in mania and in delirium, will generally suffice for an easy and satisfactory discrimination.

The diagnosis of mania and delirium tremens is important, and sometimes more difficult than that of madness and febrile delirium. The history of the case must be taken into consideration; but the same habits of drunkenness leading to both diseases, this is not always sufficient. The state of the sensorium is the chief ground of discrimination. Patients in delirium tremens have seldom or never clear and accurate perceptions; their organs of sense are affected by the disease; they fancy themselves to be surrounded by fiends or spectres, or gnawed by rats; their muscular power is greatly impaired; they are weak and tremulous, while even in the most violent paroxysm of mania the person affected sees and hears distinctly, and is strong and active in his limbs.

Causes. It is usual to divide the causes of insanity, as of other diseases, into predisposing and exciting.

1. The most important of the *predisposing* causes is a certain constitutional state, either derived from ancestry, or originating in the organisation of in-

dividuals, which renders persons in whom it exists liable to be affected by mental derangement when subjected to particular moral or physical agencies. Without such predisposition, or natural liability, the same external causes will not give rise to the like effect. When it exists in a very intense degree, the operation of slight causes is sufficient to bring about the result. This condition of body is in general not to be discovered by any external indications; it is not known to exist until the morbid process has actually taken place, or at least not till it has commenced.

In the reports of hospitals for the insane in France, the cases which are attributed to hereditary predisposition bear a considerable proportion to the entire number of admissions. In a report drawn up by M. Esquirol of admissions into the Salpêtrière, in 361 the disease was traced to various physical causes; in 105 it was ascribed to hereditary predisposition. In M. Esquirol's private establishment, where only the better class of patients are received, the last mentioned class amounts to 150, while all other moral causes are stated at 120. In a similar report from the Maison Royal de Charenton, in 256 the disease was produced by physical causes, of which 93 come under the head of hereditary predisposition; and, in 150, by moral causes. This may suffice for the present to furnish some idea of the proportional numbers, but it cannot be considered that the extent of this physical influence has been ascertained. The information obtained at the admission of patients from the lower orders of society is often imperfect, and it is probably to be ascribed to this circumstance, that the proportion of hereditary cases is so much greater in the return from M. Esquirol's private establishment than it is at the Salpêtrière, or even at Charenton.

Age and sex are to be mentioned among the predisposing conditions of insanity, as of other constitutional disorders. With respect to age, it appears from some of the dates collected by M. Esquirol, 1st, That the maximum of admissions, the cases being classed according to ages, is from thirty to thirty-five years of age; 2d, That the number in the three preceding periods of five years remain stationary. Between the ages of fifty and fifty-five years the number of admissions is less considerable. After fifty-five years the admissions decrease rapidly in both sexes, although the females are rather more numerous. These results are correct with respect to the absolute number of admissions, but on comparing the admissions with the general population of each age, we acquire the knowledge that, as age advances, the brain is deteriorated, and the intellectual faculties are weakened or extinguished. To make a strict deduction of the absolute number of lunatics relatively to their ages, it is not enough to state numerically the admissions between thirty and forty years of age; it is necessary to search out and to know the number of lunatics compared with that of the population in each age.

For this reason we have stated the ages of 12,869 lunatics, observed at Bicêtre, at Salpêtrière, and at Charenton; we have classed these 12,869 individuals according to their ages, and we have reduced them to a geometrical scale, thus displaying at one view the number of lunatics in each age. This same proceeding has been followed with regard to ten millions of individuals from the general population, classed according to their age, in order to show the proportionable numbers proper to each epoch of life. The *Annuaire du Bureau des Longitudes* has served for the basis of this work, which has been effected by Dr. Leuret.

The absolute population diminishes according to the ages of men: this diminution is gradual, and operates in the proportion very nearly of twenty to thirty-five years; it is greater from thirty-five to forty-five; more decided from forty-five to sixty; very rapid after sixty or sixty-five. From this epoch until the last stages of disease, this diminution operates regularly, and almost in a geometrical progression.

The frequency of madness compared with the ages of men does not always follow the same law as the general population; it offers very singular anomalies,

although it goes on increasing. Thus as a man advances in years, he is more exposed to the causes which excite insanity, but with different chances, relatively to age. There are a smaller number of insane persons from twenty to thirty years of age, compared with the population of that epoch of life; there are more from thirty to forty years, although the population is diminished; and, nevertheless, the number of madmen is less, compared to the population in the following ages; from forty to forty-five years the population is diminished, and the relative number of lunatics increases in proportion to this very diminution; it is the same from forty-five to fifty years. The relative increase in the number of lunatics is more marked still from fifty to fifty-five years; from seventy to seventy-five, and from seventy-five to eighty the number of lunatics, compared to the population, is enormous. This is the age of senile dementia.

Thus although it is numerically, and in a manner absolutely, true, that there are a greater number of lunatics from the ages of thirty to forty years than before or after this period of life, we shall be deceived if we draw the conclusion, that it is the age in which men are most prone to insanity, since relatively to the general population there are fewer persons insane from twenty to thirty years of age than after that period.

The same writer has computed the relative frequency of madness with regard to the sexes. It seems from his computation, that in 76,000 persons affected with insanity, the proportion of males to females was nearly as thirty-seven to thirty-eight, and this varies in different countries and under different circumstances. The proportion varies but little from that of the two sexes in the general population.

2. In the reports obtained from different quarters, relative to the *exciting* causes of insanity, there is infinite variety. So much is left to the private judgment of persons who make the entries in different hospitals, that the statements are likely to be affected by various prejudices, or preconceived opinions. We have been assured by M. Guerry, whose extensive researches in statistics are universally known, that he could obtain no satisfactory information on the relative frequency of insanity produced by physical and moral causes. In some countries the reports attributed by far the greatest proportion of cases to physical, and in others to moral causes, without any difference of circumstances that can account for such a variety in the statements. The French writers, to whom we are indebted for so many important additions to the information previously obtained with regard to the nature and causes of insanity in its different modifications, attribute by far the greatest influence to moral causes. In a memoir presented by M. Esquirol to the Society of Medicine (now the Royal Academy), in 1818, it was stated that cases of madness occasioned by moral causes are, to those resulting from physical causes, in the proportion of four to one. The calculations of M. Pinel amounted nearly to the same conclusion. According to M. Georget, it was an observation almost proverbial in the Salpêtrière, “qu'on perd la tête par les revolutions de l'esprit.” He says, “the first question that M. Pinel puts to a new patient who still preserves some remains of intelligence is, ‘Have you undergone any vexation or disappointment?’ Seldom is the reply in the negative.” “It is,” continues the same writer, “in the age in which the mind is most susceptible of strong feelings, in which the passions are excited by the strongest interests, that madness is principally displayed. Children, calm and without anxiety, incapable of long and extensive combinations of thought, not yet initiated into the troubles of life, and old men whom the now vanishing illusions of their preceding age and their increasing physical and moral weakness render indifferent as to events, are but rarely affected. The same remark applies to persons who, in their constitution, approach to the character of children or of old men.”

Among moral causes by far the most influential, as it appears from these reports, are reverses of fortune, misery (meaning poverty), and domestic griefs

or cares; next to these are disappointments in love; then "*dévotion exaltée*." It must be remembered that these reports relate to the lunatic hospitals in a catholic country.*

Among physical causes, or those so termed, vicious indulgences are by far the most frequent and powerful in their influence. Drunkenness (especially dram-drinking) is, among the lower orders, the cause of madness in a great proportion of cases. Libertinism and immoral habits come next in order; and it would appear that the derangement produced by these causes, and especially that occasioned by masturbation, is of a severe form, and more apt to degenerate speedily into dementia than those occasioned by any other causes whatever. Blows on the head, suppression of evacuations or of eruptive disorders, insolation, and other accidental complaints affecting the brain and tending to induce inflammation of that organ, are causes of inferior moment in respect to the proportional number of cases produced by them. The collective number of such cases is however considerable.

Treatment. The treatment of insanity has generally been divided into the remedial and moral:—

1. *Remedial treatment.* Insanity is a disease of the brain, or the result of a state of that organ which is different from its usual condition. To remove this condition, or to change it into the healthy state, is the first suggestion that occurs to the mind of the physician who is called to treat a case of madness. Two preliminary inquiries immediately present themselves. The first is, in what the diseased state of the brain consists, and what is the precise deviation from the healthy condition that has taken place? the second is, can that morbid change be reversed, or is it to be obviated by remedial means?

On the first of these questions pathological anatomy has thrown some light, though it has not fully solved the problem. There seems on the whole to be abundant proof, that the state of the brain in madness is one closely allied to inflammation, and perhaps we may venture to say, certainly constituting inflammation in some parts of the encephalon, and principally in the cortical or cineritious substance of the brain. In cases of general paralysis it is manifest, from the researches of Calmiel and Foville, that inflammation of the white substance is superadded. The general inference, as to the inflammatory nature of the cerebral disease subsisting in madness, is confirmed by pathological observations on the physical causes which often give rise to insanity, such as the use of ardent spirits, exposure to heat, injuries of the head, metastasis of cutaneous diseases, suppression of habitual evacuations. That excessive intellectual exertion or agitation of the feelings should give rise to the same result is in strict accordance with this pathological conclusion; since excessive action in any organ is, under ordinary circumstances, followed by inflammatory disease. From these considerations we are led to infer, that the state of the brain in madness is nearly allied to that which constitutes inflammation. That this is a condition often within reach of remedies is well-known.

The important question is, whether experience sanctions the use of ordinary antiphlogistic measures in cases of insanity. We shall begin with considering the propriety of bleeding as a remedy for madness.

The testimony of practical authors is so contradictory on the question, that it is quite impossible to reconcile them. We shall be very brief in adverting to the controversy.

M. Foville is one of the most strenuous advocates of the propriety of copious bleeding as a remedy for insanity: he recommends it not only for the pathological considerations above adverted to, but also on practical grounds. M. Foville was for some years physician to a very large lunatic hospital, that

* In the *Treatise on Insanity* the reader will find a collection of facts intended to illustrate the nature of what is termed "Religious Insanity," and its relative frequency in different countries, catholic and protestant. The other moral causes belong to the influence of different passions; but the sum total of cases produced by the latter bears a very small proportion to those which are classed under the heads above mentioned.

of St. Yon, in the department of the Lower Seine, and consequently has had extensive opportunities of forming a practical opinion.

Dr. Rush and Dr. Haslam, both of great authority as practical writers, and likely to form a correct judgment as to facts submitted to their observation, and who had both very extensive experience in hospitals devoted to the care of the insane, are decided in recommending the abstraction of blood as the principal remedy in madness. Dr. Haslam says, that bleeding is the most beneficial remedy that has been employed in this disease, and that it is equally so in melancholic as in maniacal cases. The quantity of blood to be taken must, as he says, depend on circumstances. He recommends that it be taken from the head by cupping: eight to ten ounces may be drawn at first, and the operation repeated as circumstances may require; this however is rather indefinite. He adds, that when a stupid state has succeeded to one of high excitement, bleeding is contra-indicated. Dr. Rush recommends much larger bleedings than those advised by Dr. Haslam. He speaks of having taken 200 ounces in less than two months, and begins by taking from twenty to forty ounces from a patient standing erect, in order to produce syncope.

In opposition to these we must state the opinion of the celebrated French writers, Pinel and Esquirol, who condemn the practice of bleeding entirely, and declare it to be their opinion founded on their experience, which has been very extensive, that bleeding is not only useless in cases of insanity, but most pernicious, and tends to bring on a state of hopeless dementia.

In the Gloucester County Lunatic Asylum, under the care of Dr. Shute and Mr. Hitch, where, as we have seen, a highly favourable result is obtained in the average number of recoveries, and the practice of which hospital may be cited as eminently successful, bleeding is never performed. Cases in which a state of high excitement would induce many practitioners to prescribe copious bleedings, are treated with stimulants and a full diet. The result is favourable: there are, as we have seen, very numerous recoveries; and, what is remarkable, sudden attacks of apoplexy, paralysis, or other affections depending on vascular repletion, such as many persons would auspicate from the practice here pursued, have not been known to occur.

From what has been said it will be apparent, that we are not to regard bleeding as a general and indispensable remedy in the treatment of insanity, or to expect from it those decided and unquestionable benefits which arise from the adoption of the same measure in cases of inflammation of the joints or thoracic and abdominal viscera. It must be remembered, that the cases admitted into asylums are often not very recent: in many instances they have been beforehand subjected to depletion. We therefore cannot consider the negative evidence resulting from the practice of the Gloucester Lunatic Asylum, or from that which has been adopted in hospitals under the care of M. Esquirol, as fully conclusive against the use of the lancet in cases of recent mania. It must in particular instances be left to the judgment of an experienced and skilful practitioner, to discriminate the cases which require bleeding from those in which that remedy is inadmissible. A general rule, however desirable, is not to be obtained; but some suggestion may be useful as to the particular phenomena which furnish an indication.

As contra-indications to the employment of evacuant remedies, but especially bloodletting in insanity, the following considerations deserve attention:—weakness and irritability with feeble powers—symptoms approximating to delirium tremens—frequent compressible pulse with throbbings, without strength of the carotids, and feeble circulation in the extremities—clammy cold skin, especially of the hands and feet—profuse though warm perspirations—tremulous tongue or voice—tremor of the limbs. Such symptoms accompanying mania should make the practitioner cautious in employing depletive measures, though they do not always preclude the topical abstraction of blood. In puerperal mania bloodletting is rarely admissible.

The beneficial effects derivable from abstraction of blood may be promoted

in cases which allow of its adoption; and in cases which preclude the use of this measure, the same purpose may be in some degree attained by the aid of other means partly general, and in part locally applied.

Of the first class are antiphlogistic medicines, or those which produce relaxation of the vascular action, as Cullen would have said, of vascular tension. When a full hard pulse, hot and dry skin, coexist with maniacal excitement, no class of remedies is more indicated than nauseative medicines. Many recommend the infusion of digitalis. We have generally found that tartarised antimony will answer all the purposes for which digitalis has been adopted, and that it is more speedy in the effect, and much more manageable, if such a term be allowed. Two or three grains of tartarised antimony given every three hours, with the addition of a small quantity of opium, in order to prevent its speedy rejection by the stomach, will in many cases bring about in a short time a general relaxation, free perspiration, a soft pulse, and a cooler skin. If constipation has existed, purgatives should be given at the same time, such as scammony and calomel. The stomach often rejects the dose, but not till it has remained a sufficient time to excite the action of the bowels.

Shaving the head and keeping it covered with an ice cap, and the application of cold water and the various means of refrigeration, have an important effect. The most efficacious way of applying cold to the head is that practised by M. Foville, of directing a stream of cold water through a flexible pipe directly on the head. The most violent and refractory patients are easily quieted by this method. When frequently repeated and followed by the continued application of cold lotions, while the feet are kept warm, it is an useful auxiliary to the means of reducing inflammation of the brain or its membranes.

Counter-irritation is in some instances of great value. Setons and issues have been tried in numberless instances. General experience condemns their use in mania. They occasion much irritation and no benefit. Blisters are more successful, as the irritation is of short duration, and the discharge is of service. If there is no unusual heat upon the scalp, it is better to apply them over the vertex, or to cover at first the anterior and afterwards the posterior half of the head by a blister, which is to be speedily removed after the skin has become inflamed. This remedy is strongly indicated in cases attended with stupor. Stupor amounting to dementia, and constituting one modification of that state, has been most successfully treated by an issue formed in the scalp over the sagittal sutures.

A most important resource for tranquillising the system, and bringing back the healthy condition of the brain, is the use of opium. There are few disorders in which so much benefit is derived from this remedy as in cases of insanity. While the skin is hot and dry, and the pulse full and hard, it is injurious; but when relaxation has been induced by the means above suggested, opium may be safely given. Sometimes a large dose, as two or three grains given at once, will answer the end of procuring sound and refreshing sleep. A better method in general is to prescribe ten grains of Dover's powder, with or without tartar emetic, every third or fourth hour until sleep is induced. After sound sleep thus induced it is often found that the disease is almost cured.

The attempt to cure madness by restoring through the immediate agency of remedies the healthy condition of the diseased organ, viz. the brain, has its application chiefly to the early stages, and to the more acute cases of insanity, and especially of mania. In cases of slower development or of a chronic form, and in the advanced stages of the most acute attacks, the means above described can only be adopted on a more limited scale, which will require discretion and practical judgment.

In later periods of insanity, and in the more chronic cases, the principal indications are to support and promote the physical health of the patient, and at the same time to mitigate the disorder which affects the mental powers. As we have seen that death is occasioned by diseases affecting the organs of phy-

sical life, our attention must be directed, and it often may be directed effectually, to the prevention or removal of them. The restoration of physical health very often produces relief and even cure of the disorder of the mind. The latter is so associated with the former, that this gives way after the restoration of bodily health. It is well-known to every person who has had the care of lunatics, that when patients are brought to them, as they often are, from their private dwellings, or from madhouses, where they have been suffered to fall through neglect into a state of squalid cachexia, and are fed with wholesome and nutritious diet, and the casual complaints which may have befallen them, whether affecting the abdominal or thoracic viscera, are relieved or cured by judicious means, the mental disorder often gives way at the same time. Care must be taken to restore the general health, to ascertain and remove any morbid affections of the digestive organs, the functions of which must be regulated by appropriate remedies. The subcutaneous circulation must be promoted by warm bathing, friction, warm clothing, a warm atmosphere, and such bodily exercise as the state of the patient admits. Exercise in the fresh air, a nourishing diet, consisting of animal and farinaceous food, malt liquors and some wine, and occasionally the use of vegetable tonics and bitter astringents with carbonates of potass and ammonia, are to be prescribed according to the particular indications of circumstances.

In females the catamenia should be restored when deficient, if that can be done by remedies.

At the same time the condition of the mind will require particular care, and this brings us to the subject of the moral treatment of insanity.

2. *Moral treatment.* The moral treatment of the insane depends on the principle of removing from their presence all objects which are calculated to excite and foster their morbid feelings, and to surround them with circumstances of which the tendency is to withdraw their attention from such feelings and ideas, and induce a return to natural and healthy habits of mind. It is with a view to this indication in part that medical writers recommend the removal of insane persons from their homes and from society, and, what is by long custom generally connected with such a proceeding, the shutting them up in asylums kept for the reception of lunatics.

The propriety of secluding insane persons in such hospitals requires to be treated both as a medical and as a legal or medico-legal question. Legislators have provided for the arrest of insane persons who disturb or endanger the public tranquillity; they have ordained the confinement of such individuals in receptacles which are appropriated to their detention, and have enacted a suspension of the rights which those who are sane possess, and can alone with propriety exercise in disposing of person and property according to their inclinations. Of all these arrangements the maintenance of public order is the principal object, and the second is the preservation of the property belonging to the lunatic and the interest of his family. It belongs to medical jurisprudence to determine under what circumstances such proceedings are required for the objects above mentioned: the inquiry comprehends what are termed *medico-legal* discussions. Our present engagement is with a consideration strictly medical, viz. under what conditions and in what manner confinement or seclusion is required in order to promote the recovery of insane persons?

M. Esquirol has long devoted his attention to this subject, and in his various writings, published from time to time, has recapitulated the arguments on which he has founded the opinions first expressed by him more than twenty years ago. In his last work, in which he has embodied the results of his long and extensive experience, the same question has been more fully investigated. As it is one with regard to which it is of consequence to have the authority of so great a writer, in order to determine fully the conviction of medical students and practitioners, and give them that confidence which is sometimes necessary in order that they may be qualified to contend with particular prejudices, and even with public opinion, we beg to refer to M. Esquirol's work.

It must be observed, that all these arguments for the seclusion of the insane are of partial application, though they are by no means equally applicable to all the forms and modifications of insanity. Maniacs who require to be confined in their beds and treated as delirious persons during the acute stage of their disorder, cannot be removed from their houses, or would derive no benefit from such a removal. In the advanced period, seclusion, and even some coercion, is absolutely requisite for insane persons of this class. All the reasons urged in favour of separation apply to monomaniacs and those who labour under moral insanity, and it is particularly in these instances of the disease that confinement in asylums becomes necessary. With regard to melancholia it may happen occasionally that removal from home aggravates the dejection and sorrow with which the mind is already overwhelmed: the result is generally otherwise, great benefit arising in many cases of melancholia from placing the patient in an asylum where there is a judicious selection and classification of the inmates. The company of eccentric but cheerful persons tends powerfully to abstract them from the subjects of their gloomy thoughts, and excite reflection on the fallacious nature of their own morbid impressions. If there is any propensity to self-destruction, or if the degree of melancholy dejection is so great as to point out the danger and probability of such attempts, it is the more obviously and imperatively necessary to have recourse to confinement, no degree of vigilance that can be exercised in private dwellings will suffice for security against such calamities. We have known several lunatics who, contrary to the advice repeatedly given, were kept at home or in private lodgings, under the care of keepers procured from lunatic asylums, and who contrived to elude the most vigilant watching and destroy themselves. When the patient is misanthropic and malicious, he will find some means of gratifying his revenge if not confined and kept from the opportunities of committing injury; and this can only be obtained safely in an asylum.

A considerable proportion of the inmates of most lunatic asylums are demented persons, or those who have become incoherent and fatuous. Such persons are very nearly in the condition of old men in the state commonly termed second childhood. There is nothing in the nature of their disease which renders confinement necessary or advisable on their own account, and it is only with regard to convenience that it can be recommended. Many retain only a merely physical existence, and to them it can be of little consequence, provided that their bodily comfort is cared for, whether they live at home or in a madhouse; but there are others who have at times glimpses of reason and momentary returns to a natural state of their feelings. There are many considerations which ought to induce families to keep such individuals at home and take care of them in their own dwellings, but they are generally reckoned among madmen: the change in their state from insanity to dementia is unknown to their relatives, who are too ignorant to comprehend the nature of such an alteration in the disorder, and they remain for life and die in lunatic asylums. It must be observed, that in well-regulated houses of this description, many of the inmates, though in the state just alluded to, are on the whole more comfortable than they would be under the care of their own relatives; and this remark includes nearly all who belong to the lower or poorer classes.

It is the opinion of M. Esquirol, that patients who become convalescent are often removed too soon from lunatic asylums, and that this is especially the case in England. So strong a predisposition to the disease appears to remain for some time after its apparent cure, that convalescent patients are known to undergo relapses, when excited by such emotions as they are almost sure to experience as soon as they are at large, and can only be protected from by seclusion continued as long as this extreme susceptibility remains. M. Pinel has given some important remarks upon this subject, which we shall briefly abstract. He observes that any sudden alarm, transport of anger or of grief; that intemperance, hot weather, or even a sudden change from a state of confinement and constraint to liberty, is liable to produce in convalescent lunatics

a disturbance of which they would not be susceptible in other circumstances, and to renew the attacks of mania when the habit has not been long suspended; that some convalescent patients who have been taken away too soon by their friends have suffered relapses, and have been obliged to return several times to the hospitals.

Every available method should be adopted for withdrawing the attention of insane persons from their morbid impressions. Exercise by walking or riding in the open air, during as great a portion of the day as the strength of individuals will support the fatigue resulting from it, is often of great service. We have known instances in which both insane persons and hypochondriacs have been greatly improved by adopting this rule, and systematically adhering to it. Long walks in fields or woods, in company with a suitable guardian, have aided principally in the restoration of health in some instances in which the relatives of patients have refused to send them to a lunatic asylum. All establishments of this description ought to be provided with the means of affording regular employment, in the open air, to such patients as can be induced to undertake it. Gardening and various agricultural works should as much as possible employ their time at stated periods of the day; and by system and judicious management many of the inmates of these asylums may be brought into the habit of devoting themselves mechanically to such occupations. It is said that a farmer in Scotland once obtained a high reputation for the cure of mental diseases. He employed lunatics in his farm, made them work in tillage, fastened them to his plough, and by degrees brought the most violent to a state of quietness and submission.

M. Fodéré cites with commendation Dr. Wendt's account of the lunatic asylums at Copenhagen, and some others in the North of Europe recently established or improved. In these hospitals we are informed that all arrangements for instruction are on the best contrived plan; and that the principle of gentleness in the treatment of the patients is carried further than elsewhere. "All violent means of repression are proscribed, such as chains, the rotatory machine, solitary confinement, harshness of manner, and forced abstinence; lunatics are treated in such a manner as to spare them as much as possible the conviction of their real state." It may be doubted whether this is always advisable. "Patients whose attacks abate in violence are admitted to the society of the director, take their meals with him; they are allowed free intercourse and society among themselves, and care is taken to furnish them all such occupations as are consistent with their habits and education. The men are occupied either with military exercises, or they cut wood, or cultivate the soil; the women wash linen, and knit, spin, sew. Both sexes are taught geography, drawing, and music. On *Sundays*," says Dr. Wendt, "they are allowed to play cards, billiards, and in some asylums are made to act comedies. Convalescents have the use of a library and reading-room, where the public journals are put into their hands." Female patients and men of sedentary habits should be engaged as much as possible in some regular occupation. This rule is followed with great advantage in some of the hospitals for lunatics in France, where the females occupy their time in embroidery and working in various ways. It is found, as before mentioned, that even in the early stages of dementia it is not impossible to induce such patients to work steadily at some merely mechanical employment. Such habits mitigate the disease, and at least its manifestations, and in many cases they tend strongly to promote recovery.

V. HYPOCHONDRIASIS.

Hypochondriasis, or the hypochondriac malady (or the vapours, as it is vulgarly called), is often supposed to be merely symptomatic of difficult digestion. Disorders of the different viscera and of the functions of physical life are in a very curious manner connected with states of the mind. It is a well-known fact, that dyspeptic and flatulent persons are ge-

nerally subject to lowness of spirits. Nephralgic diseases are accompanied with an anxious fretful state of mind, beyond what can be explained by reference to actual sufferings of the patient, to pain or irritation in the kidneys or bladder. Phthisical patients are always sanguine of recovery, and in good spirits generally, and cheerful to the last. A proneness to violent emotions and passions is remarked as symptomatic of organic diseases of the heart. Slight cases of hypochondriasis might be referred to this explanation; but the disease is of a graver nature, and the more severe examples pass into undoubted insanity. Hypochondriasis is in fact a modification of insanity.

Every medical practitioner is well-acquainted with hypochondriasis in its ordinary form. It is well-characterised by Sagar:—“*Desperant ægri de sua valetudine recuperanda ob ructus, borborygmus, palpitationes, tremorem precordiorum, fugaces vertigines, flatulentiam. Hinc persuasi fatum lethale sibi imminere, omnia symptomata et minimas mutationes in corpore suo scrupulosè observant, narrant et describunt medicis, suisque querelis alios mox et alios defatigant, ingenio cæterum et appetitu pollentes.*”

Patients labouring under hypochondriasis often complain of severe pains in the hypochondria, whence the name of the disease. They often refer their uneasiness chiefly to the left hypochondrium, where there is in reality considerable fulness and induration; in some instances there is considerable enlargement of the abdomen, with a degree of hardness and a feeling of consolidation, which excite suspicion of some organic disease. The tongue is generally clean, or covered with a slight brown coat; the stomach is the seat of every symptom of disordered action; the appetite is often irregular, sometimes voracious, and hardly to be satisfied, though more frequently there is a total want of inclination to eat and even a loathing of food; after eating the patient generally complains of a sense of weight and uneasiness in the stomach; sometimes this amounts to very severe pain, which recurs at a short interval after every meal, and eructation, cardialgia, or a sense of burning heat at the extremity of the œsophagus, ensue, and, after a long time, wind is expelled in large quantities, with a sense of cramp succeeding the effort; sometimes viscid mucus is brought up with half-digested food, and a fluid so strongly acid as to corrugate the throat and set the teeth on edge. In other cases nausea prevails almost constantly, and prevents the patient from taking sufficient food for supporting strength; when a small portion is swallowed it produces great irritation in the system, headach, pulsation in the epigastrium, and flushing in the face; occasionally these symptoms are relieved by vomiting. The patient experiences severe pains through different parts of the abdomen, which he describes as burning, twisting, tearing, and distending, the bowels, seizing suddenly different parts of the alimentary canal. He feels a momentary relief when wind is expelled, but the sense of distension soon returns.

Besides complaints referred to the abdomen, morbid feelings are experienced in different parts of the body, and more especially in the head. Patients complain of violent pains in the forehead and temples, sometimes in the occiput, of severe and distressing headach, with intolerance of light. In more frequent cases they experience, not pain but some indescribable sensations, which are more difficult to endure than the most severe pain; a sense of intolerable pressure on the top of the head threatens, at every moment, to extinguish consciousness and life itself; the head is as if squeezed in a vice, the scalp is drawn tight, and the eyes are felt as if starting out of the sockets: these sensations alternate with vertigo, or a feeling of giddiness; the eyes sparkle, twinkle, or grow dim; vision is impaired; it is impossible to look at a book, or to direct the eyes for a moment to any near object, without experiencing a sense of confusion; there is a noise in the ears like the ringing of bells, bursting, boiling of tea-kettles, rushing of water, the sound of a steam-engine, strange voices, sudden cracklings, whizzings. The power of attention is destroyed, at least the patient is persuaded that such is the fact, though,

when aroused by any sudden intrusion from his tale of sufferings, he is as lively and as acute as ever; he cannot think—his ideas are confused. Sometimes he fancies that his understanding is utterly destroyed, that he shall become insane and die in a madhouse. The susceptibility to all impressions on the senses is morbidly increased. Light, sounds, noises, are intolerable.

During the actual presence of the disease the physical functions are more or less affected. Digestion is performed in the most imperfect manner; flatulence and gastralgia are constantly prevalent; the tongue is furred and often brown and dry; the skin is cold, clammy; the body becomes, sooner or later, emaciated.

Causes. Attacks of hypochondriasis are chiefly occasioned by causes acting on the nervous system. It is stated by M. Louyer de Villermay, that, in twenty-two cases of this disease out of thirty-six, it was occasioned by moral affections of a painful nature, by which we are to understand, causes giving rise to mental distress; in eight cases out of the same number it was occasioned by too close application to study; in two it arose from fright or sudden alarm; in two it followed an immediate transition from a state of life requiring great activity to one of ease and leisure. These facts are favourable to the opinion, that hypochondriasis is a primary disorder of the nervous system; a conclusion which has been adopted and supported with much ingenuity by M. Georget. This writer considers the disease in question to be one of the brain, excited by the influence of moral agents, or by those causes which act in a hurtful manner on the mind, and through that medium on the brain. He observes, in support of this opinion, that hypochondriasis is most common, in the higher classes of society, among persons occupied in official and diplomatic business, or devoted to literary pursuits. "England," he adds, "is perhaps the country where this species of nervous disease chiefly abounds: this is principally owing to the prodigious activity of mind which exists in that country; to the miseries which are contingent on the great development of industry; to fortunes rapidly acquired in commerce by a number of individuals, who subsequently pass their whole lives without employment in excesses of every description.

In many cases of hypochondriasis the symptoms refer themselves principally to the state of the heart, the action of which is often so violent or irregular and interrupted as to excite suspicion, even in the mind of the medical attendant, indeed, of organic disease.

Many individuals have been subjected, in such cases, to rigorous antiphlogistic treatment, under the supposition that there existed organic disease of the heart.

This error can scarcely be committed by those who are practically familiar with the healthy, as contradistinguished from the morbid, sounds of the heart.

Nature. Various opinions have been maintained respecting the seat and nature of hypochondriasis. Broussais maintains with some modification the opinion, formerly general, that its primary seat is in the stomach and small intestines, in the form of chronic gastro-enteritis. M. Georget has contended, with greater success, that it has its origin in the brain. We cannot, indeed, otherwise account for the variation in the phenomena. At one time the chest, at another the abdomen, is the local seat of pain, or of an indescribable uneasiness; and, in fact, often the principal manifestation of the disease. This could hardly be the case if the primary seat of disorder were in the stomach and intestinal canal; but it is quite intelligible if the disease is in the brain.

Hypochondriasis, like insanity, is often recurrent. Persons will give up all their occupations, and banish themselves from society, or pass their time in bed for some months, and then without any apparent reason suddenly revive, resume their wonted cheerfulness and vivacity, and will remain, perhaps for years, free from all symptoms of their disorder, and then without any apparent cause fall again into the same state.

Treatment. Remedies which tend to restore the physical functions to a

healthy state, and principally those which relieve dyspeptic complaints, are sometimes of use in palliating the distressing complaints of the hypochondriac; but the only effectual relief is obtained by removing him from the causes which have oppressed his mind and nervous system. All practical writers are agreed in recommending travelling, change of scene, and all the means of diverting the attention. Places resorted to for the use of mineral waters are much frequented by patients labouring under this disease.

There is no particular method of treatment by medicine that has been found invariably advantageous, and yet there are few cases in which the physician will fail, by attentive observation of symptoms and their obvious suggestions, to afford some relief to the patient. The whole class of nervines and anti-dyspeptics are constantly put in requisition every day in the treatment of hypochondriasis. Ammonia, camphor, ether, assafœtida, galbanum, myrrh in different mixtures and preparations, are not without their use. Warm purgatives are perhaps, of all other remedies, the most frequently approved. When there are any signs of chronic gastro-enteritis, leeches must be applied to the abdomen and epigastrium; but such cases are in very small proportion. If the chief complaints are in the head, which is the fact in one third of the cases occurring in this country, leeches behind the ears, followed by blisters to the occiput, are sometimes found to afford temporary relief; but the majority of patients do not bear much abstraction of blood, or remedies which lessen the vigour of the general system or of the circulation. The due regulation of the bowels by a course of mild alterative aperients, followed by preparations of light bitters, and strict adherence to a mild nutritious diet, with daily exercise, especially horse exercise if it can be obtained, should be enforced on all nervous or hypochondriac persons.

VI. PUERPERAL INSANITY.

The term puerperal madness is given by medical authors to any species of mental derangement incident to women, either during pregnancy or soon after delivery, or during the period of nursing. The whole constitution of females is so much affected by either of these conditions, and the functions of physical life must be so much disturbed and put out of the usual course during their continuance, that the state of the animal system must also be modified, and any morbid predisposition is likely to be, under such circumstances, occasionally brought into action. But the states of constitution during pregnancy and lactation are very different from that of the puerperal period, and the characters of mental disorder which are displayed at these times are also different. It is therefore improper to comprehend all the affections described under one designation and in full; such a proceeding is likely to lead to error, both in treatment and in prognosis. This mistake was avoided by Sauvages, who distinguished two kinds of insanity incident to females, terming one *Paraphrosyne Puerperarum*, and the other *Mania Lactia*. The former, only, is properly termed puerperal madness.

This disease generally comes on within a few days of delivery. The facts furnished by M. Esquirol, from the registers of the Salpêtrière, are the most authentic source of information as to the period of the attack. We learn from them that 92 females, labouring under puerperal madness, were admitted into that hospital during four years. Of these 16 became disordered between the first and the fourth day; 21 from the fifth to the fifteenth day, a period which generally includes the cessation of the lochia; 17 from the sixteenth to the sixtieth day; 19 from the sixtieth to the twelfth month of suckling; and 19 after the weaning of their infants. The two last of these classes must be considered as belonging to the mania lactia, rather than to paraphrosyne puerperarum.

It seems, from these facts, that puerperal madness takes place chiefly about the time when the secretion of milk is set up, and from that period till after

the cessation of the lochia. It depends on the irritation which the system undergoes owing to these processes, the influence of which is severely felt under the condition of unusual weakness and excitability, resulting from the circumstances of the time.

Cases of puerperal derangement occurring, as we have said, within a few days, or generally within a fortnight or three weeks after delivery, have the form of acute mania, distinguishable by no particular feature from the ordinary appearance of that disease. Such an attack is often the effect of too early elation or excitement, or of some imprudence in diet, or of circumstances which give rise to emotion or disturb the mind: in other instances it comes on independently of any external or occasional cause that can be ascertained.

It is ushered in by a sleepless, restless, anxious state, sometimes accompanied by febrile symptoms, accelerated pulse, pains in the head, intolerance of light and of sounds. The signs of derangement in the mind are sudden in their appearance, and become at once decidedly manifest. Great excitement of feelings, loud talking, vehement expressions, wandering of thoughts, incoherence, are the usual phenomena. The secretion of milk, if it has commenced, becomes in general suppressed; the lochia commonly cease; the skin becomes hot and dry, and the patient complains of thirst, and has a total want of appetite.

It is the general opinion of practical writers, that the chief danger in cases of puerperal mania is that of speedy dissolution, and that if the patient survives a period of not long duration, the recovery of a sane and lucid state of mind may be expected as a matter of ordinary experience. The records of hospitals do not bear out this opinion. Of the 92 cases mentioned by M. Esquirol, 31 proved to be incurable, or became instances of permanent madness. According to Haslam, out of 85 similar cases admitted at Bethlem Hospital only 50 were recovered, leaving 35 as the number of incurables. Dr. Burrows mentions 57 cases, of which 35 terminated in recovery, and 11 were incurable. Dr. Gooch appears to have been much more fortunate. He says, that of the many patients about whom he was consulted, he only knew two who remained, after many years, in a state of derangement, and one of them had been so before her marriage. This statement would have been more satisfactory, if the author had specified the number of cases. We may however conclude, that the proportion of recoveries among Dr. Gooch's patients was much greater than that which occurred under the observation of Esquirol and Haslam; and perhaps the different circumstances of puerperal females in public hospitals, especially in such ones as old Bethlem and the Salpêtrière (though we do not mean to be so unjust to our French neighbours as to compare these establishments), and in the houses of opulent persons, may be sufficient to account for the great diversity of these results.

Puerperal mania is generally considered to be a disease dangerous to life, and such indeed it appears to have been under the hands of practitioners, whose sphere of observation has been chiefly in the wealthy classes of society.

We might reasonably suppose that the mortality would be much greater in the lower orders: yet, while 11 patients out of 57 treated by Dr. Burrows, died, 6 cases only out of 92 recorded in the Salpêtrière were fatal, according to the statement of M. Esquirol. According to Hunter and Gooch those patients who have acute febrile symptoms, and especially a very rapid pulse, generally die. The indications of danger are, for the most part, precisely those which denote great exhaustion of the system, and debility accompanied with considerable excitement. It may well be conceived that the risk is greatly enhanced, when, under similar circumstances, the case has been treated on erroneous principles. It is by no means an unfrequent occurrence to hear medical practitioners speak of a rapid pulse and great excitement, both in the animal and physical functions, as calling for antiphlogistic remedies, and especially the use of the lancet; and many a patient labouring under puerperal mania has perhaps been sacrificed to this error of judgment. The disease is one of indirect debility, and is perhaps analogous in some of its pathological conditions

to instances of delirium tremens or delirium traumaticum, and to some forms of febrile delirium, those namely in which the pulse is small, weak, and rapid, and the skin relaxed. A moderate and judicious use of stimuli, and especially of opium, is in these instances productive of the greatest advantage, while an opposite method almost certainly leads to a calamitous result.

Treatment. In the majority of cases of puerperal madness to which medical practitioners are called, they find the symptoms of debility and exhaustion already present. When this is the case to a considerable degree, the first and principal object must be to recruit the physical energy, to maintain the circulation of blood in a state sufficiently active for the due performance of the vital functions, and to procure sleep. A certain quantity of wine or brandy, perhaps an ounce of the latter, should be given every hour or every second hour, or even more frequently, according to the emergency of the case, and strong broth should be administered in the intervals between the doses of stimuli. In cases of extreme weakness and agitation, tincture of opium may be administered occasionally in brandy. When the warmth of the skin has been restored, the use of powerful stimuli should be laid aside, and that of opium continued. Ten grains of the pulv. ipec. comp. however, repeated every third or fourth hour, till sleep shall have ensued, will often be followed, after a few doses, by a period of great rest and a return towards tranquillity. When these objects have been attained in a due degree, or even at first if there be no alarming state of weakness tending to preclude such remedies, it is often found that small benefit arises from the use of antimonial emetics, followed by mercurial purgatives; and these are so much the more requisite when signs are present, such as a furred tongue, fetid breath, a discoloured skin, and dark and offensive evacuations, which indicate a disordered state of the alimentary canal. Such a condition of the intestines is a frequent accompaniment, and probably no unusual exciting cause of the disease, and its removal is attended with a salutary change. Such remedies should be repeated occasionally, according to the strength and circumstances of the patient, and followed by opiates in tolerably full doses.

Heat of the scalp, flushings of the face, and pains in the head, may sometimes appear to preclude the use of opium, or to render it at least a doubtful remedy. In such instances it is advisable to shave the head and apply cold lotions, or an ice cap; and if the arteries are full and pulsate strongly, and the strength of the patient admits of it, to apply some leeches to the temples, previously to the administration of opiates.

A full dose of opium, viz. two or even three grains, may often be given at once with advantage. Sometimes half a grain of the muriate of morphia may be preferable. We have generally found repeated doses of Dover's powder more successful, such as ten grains every third or fourth hour, until sleep ensues.

In cases of great exhaustion, other stimulants and tonics may be added to the use of wine and alcohol, which, however, are the most efficacious and important. Carbonate of ammonia with camphor may be given every third hour in doses of six or eight grains, if the subcutaneous circulation is defective, and the extremities are cold. Sulphate of quinine, with mineral acids in considerable doses, will be of service, if the skin is relaxed and there is a disposition to free and copious exudation.

DELIRIUM TREMENS.

History.—*Causes.*—*Symptoms.*—*Two forms of the disease.*—*Second form divided into three stages.*—*Description of the first—second—and third stage.*
—*Anatomical characters.*—*Nature.*—*Diagnosis.*—*Prognosis.*—*Treatment.*

THIS disease is distinguished from the delirium so common in febrile, inflammatory, and other maladies, by the peculiar nature of the illusions, accompanied by tremor of the hands and limbs, wakefulness, and frequency of pulse. It has been denominated *Brain Fever* by Pearson and Armstrong; *Delirium ebriositatis* by Blake; *Mania à potu* by Snowden and Carter; *Oenomania* by Rayer; *la Folie des ivrognes, Délire tremblant*, by many French writers; *Phrenesia potatorum, Delirium ebrietatis potatorum*, and many other names, by German authors; and *Delirium tremifaciens* by Copland. Though these and numerous other synonyms are derived from the prominent symptoms or supposed seat of the disorder, they are all inapplicable to many cases, and hence we shall retain the term delirium tremens, which, though it is not entirely free from objection, is universally understood; and, since its first introduction by Dr. Sutton, has been generally employed to designate the disease. Indeed, it is only since the tracts of this writer were published in 1813, that delirium tremens has been considered a peculiar affection, although there is sufficient evidence, as pointed out by Dr. Blake (*Treatise on Delirium Tremens*), that cases of it were treated by Hippocrates; and Calmeil remarks that, according to Aristotle, Denis the Tyrant had an attack of drunkenness which lasted twenty-four days. It has also been thought to constitute a large proportion of the cases denominated “*Demonomania*” by the writers of the sixteenth and seventeenth centuries, and it was described by Stoll under the name of “*Phrenzy*,” in 1778, as pointed out by Dr. Forget of Strasbourg. Even before the work of Dr. Sutton appeared, it was treated of as a distinct affection by Drs. Pearson, M’Whirter, and Armstrong, in essays on this subject, and by Drs. Saunders and Colles in their lectures. At present it is universally considered as a specific disease, and although the numerous observations which have been made regarding it, have thrown little light on its pathology, we shall endeavour to give a succinct account of its known causes, symptoms, and treatment.

Causes. It is of great consequence that the causes of delirium tremens should be ascertained, as a knowledge of the different agents and circumstances which produce it materially influences the treatment.

Among the *predisposing* causes, the excessive use of alcoholic fluids is by far the most common, and hence it is frequent in countries where spirits are cheap, as in America, and in many of our colonies: it has been more frequently observed, also, on coasts where smuggling is extensively carried on. It may follow a fit of intoxication, or the habitual use of spirituous liquors in small quantities (popularly termed *tippling*), without occasioning what may be denominated confirmed drunkenness: hence distillers, retail dealers in spirituous liquors, men employed in bottling wines or spirits, and all persons who from the nature of their occupation have facilities of obtaining wine or ardent spirits, are frequently affected. Even an over indulgence in beer has brought on the disease. The continued use of narcotic drugs also powerfully predisposes to delirium tremens. Thus, habitually taking opium, or the drugged beverages of the East, may induce a state of the constitution favourable to the production of this malady. We have seen it follow the use of beer in which *Coccus*

Indicus had been infused by an unprincipled brewer; and it is probable that the presence of the poison, not only in this but in other cases, has tended to the production of the disease.

Great mental exertion, continued for a long time without sufficient sleep, has been observed to be one of the predisposing causes of delirium tremens. Dr. J. Johnson has met with it in young ladies, whose mental powers had been exhausted by intense or prolonged study. Excessive venereal indulgences, masturbation, different febrile affections, and other circumstances which diminish the general strength, act also as predisposing causes. According to Bang, Lind, and Rayer, the affection is most common between the age of thirty and fifty; but Guldberg, from an analysis of 173 cases, found it most frequent between forty and fifty. In England, both males and females are found to be equally liable to the disorder. Bang however found, that in 456 cases, only 10 were females; and of 176 cases seen by Rayer, 7 only were females. The difference in these observations can only be reconciled by supposing (and this we believe to be the fact), that in England, and more especially in London, females of the lower orders indulge to a great extent in the use of ardent spirits. According to Guldberg, twice as many cases occur in May as in any other month; but Bang considers the disease to be just as frequent in June and July. Their united observations tend to show, however, that the disorder is most common in summer.

Delirium tremens has often been observed in individuals of a weak constitution and irritable temperament; but, on the other hand, it is not unfrequent in strong, robust, and plethoric individuals. Even in these latter however, as, for instance, among the porters of London, it may be questioned whether the strength is not more apparent than real, and that before the disease appears, a state of debility has been induced by the quantity of beer and spirits they consume. Numerous observations tend to show that delirium tremens is most common in individuals of a weak and depraved habit of body. We have been informed by Mr. Atherstone, who has practised some time at the Cape of Good Hope, that he has observed the disease most common in such native tribes as are idle, sedentary, and possess little physical power, rather than in such as are industrious, engaged in field exercises, and warlike. Hence it is frequent among the Bushmen and Hottentots, but rare among the Caffres. This observation is in favour of what we have just stated.

Exciting causes. The principal exciting cause is the too sudden abstraction or diminution of the alcoholic or other stimuli to which the individual has been accustomed. Thus soldiers or sailors deprived of their usual quantity of spirits have often been attacked; drunkards rendered unwell, meeting with accidents, or thrown into prison, and put upon low diet; opium-eaters, obliged by circumstances to relinquish their habit, are frequently the subjects of this malady. It may be directly induced by potations of spirituous liquors, and then it may exist with, or follow, intoxication and a protracted debauch. In habitual drinkers, also, slight symptoms are often observed every morning until recourse is had to the usual stimulus. Another exciting cause is the shock given to the system by wounds and operations. The state thus occasioned is exactly the same as that produced by the sudden deprivation of the accustomed stimuli. The disorder arising from this cause has been denominated by Dupuytren, who first called the attention of the Profession to it, *delirium traumaticum*. In several cases, also, it appears to result from great mental depression or despondency, particularly in young men leading a life of debauchery. We have seen it in such individuals following acute feelings of shame, especially after receiving urgent and kind remonstrances from their friends. Lastly, the disease may supervene on typhus fever, scarlatina, erysipelas of the scalp, pneumonia, acute rheumatism, and various other acute disorders.

Symptoms. Delirium tremens, like most affections of the nervous system, may be connected with an increased or diminished action of the vital powers. To the latter condition, however, the term delirium tremens is usually applied;

the former being considered by most authors only a modification of the disease. On the other hand, in this as in other nervous diseases, cases sometimes occur of a character so complex as to make it difficult to determine whether they belong to the one or the other; but as it is of great importance with a view to treatment, that a distinction should be made between them, and as the symptoms of each are, with these exceptions, sufficiently constant to render their diagnosis a matter of no great difficulty, we shall consider delirium tremens as occurring under two distinct forms.

The *first* form appears during the progress of a protracted debauch, or shortly after a fit of intoxication, or an excessive use of opium and other stimuli. It is characterised by delirium with great irritability, often much violence, and sometimes vomiting and convulsions. The head is hot; the face flushed; the eyes bloodshot, or injected and suffused; the countenance expresses a degree of wildness and fury; the tongue is dry or cracked, and red at the point and edges; the pulse is frequent, full, or hard; the skin dry; in the intervals of delirium the intelligence is confused; there is often, but not always, trembling of the hands and sometimes of the whole body, with constant wakefulness, or short restless slumbers which afford no relief. These symptoms gradually pass into coma, and sometimes there are convulsions before death. It generally happens, however, that if appropriate treatment be employed, the patient recovers, as a first or even second attack is rarely fatal. Occasionally it passes into the second or third stage of the form next to be described, especially if the disease has been mistaken, and depleting remedies have been carried too far.

The *second* form is that which is generally denominated the true delirium tremens; and with the view of rendering the description as accurate as possible, we shall, after Dr. Blake and other writers, divide it into three stages.

The commencement of the *first stage* is announced by symptoms of general debility: the countenance and general habits of the patient undergo a remarkable change; he is dejected, restless, and melancholic, sighs frequently, and complains of oppression of the præcordia; the sleep is short, and disturbed by painful dreams; on rising in the morning there is fatigue and weakness, slight fever, with loss of appetite, loathing of food, nauseous taste in the mouth, feeling of sickness, sometimes vomiting and cramps of the extremities; the tongue is moist, sometimes furred and tremulous; the bowels are generally open, although occasionally costive; the pulse is slow, soft, and easily compressible, often feeble and irregular; the hands and feet are cold and clammy; there is excessive perspiration from trifling exertion, generally vertigo and confusion of ideas, and sometimes, though not always in this stage, trembling of the hands. These symptoms may come on very gradually in habitual drinkers, when many of them are apparent in the morning, and disappear after a dose of the accustomed stimulus. Generally, however, they come on more abruptly from two to nine days after a debauch, and have been considered by some authors as the premonitory symptoms of the disorder. In the young they seldom continue longer than a few days, but in the old and more confirmed drunkard their continuance may be extended to a much longer time. If the malady is treated in a judicious manner in this stage, the cure is readily effected; and by prudent conduct on the part of the patient, any further serious invasions may be prevented.

In the *second stage* the vertigo and confusion of ideas are more marked, and the aberration of mind is more serious. The countenance of the patient has a strange and wild aspect; there is great abruptness and precipitation in all his movements; his steps are uncertain, his hands tremble, and it is with the greatest difficulty he can perform the most simple office for himself. There is great nervous irritability, watchfulness, and wandering of the mind, which latter symptom often assumes the form of complete alienation, generally of a melancholy kind; he cannot bear restraint, and if imposed, will use violence to overcome it, although there is no malignity, and he is easily governed; he almost always takes any remedies offered to him, and occasionally recognises

such relations and friends as may be near him. As the disease continues, the patient becomes covered with a clammy sweat of a disagreeable odour; he is entirely deprived of sleep; the tongue becomes more foul; the tremor of the hands is incessant in severe cases, passing into rigid spasms of the whole body; the bowels are often confined, the stools being dark and offensive, and the urine scanty; the pulse is small and soft (according to Copland, ranging between 100 and 120); the pupils are generally contracted, but without intolerance of light; the patient exhibits great loquacity, and as the mind becomes more alienated, he imagines he beholds frightful images; sometimes he fancies himself a prey to wicked spirits, who conspire to take away his life, or that he is surrounded by assassins, and is constantly endeavouring to escape from his imaginary enemies; on some occasions he believes that rats, mice, and other animals are continually running over him, or that he is threatened by demons, black angels, &c. Indeed countless absurdities, sometimes of the most extraordinary nature, occupy the mind of the sufferer, which, having all the appearance of realities, influence his conduct and conversation. These symptoms may remain three or four days, and during that period may be subject to various remissions, in which the individual appears exhausted from his previous efforts. Recovery is always ushered in by a sound sleep, which frequently continues twenty-four hours, and has occasionally extended to thirty-eight. A sleep of six or eight hours, however, has been followed by recovery; but should this not supervene, sooner or later the next stage is constituted.

The *third stage* is characterised by depression of the vital powers, and a state of collapse which somewhat resembles that in the last stage of typhus. Sometimes the patient dies almost suddenly in convulsions, or there is a short interval of calm, and then violent delirium, during which there is violent struggling, and great perspiration immediately before death. In general, however, the fatal symptoms come on more gradually, and may be known by coldness of the hands and feet, slowly extending over the surface; by the pulse rising in frequency, becoming in some cases too quick to be numbered, and often thready and scarcely perceptible; by the increasing tremor of the hands, occasionally attended by trembling of the whole body; by the hands, feet, and more or less of the surface being covered with perspiration, which exhales a peculiar smell, somewhat between a vinous and alliaceous odour, as pointed out by Dr. Hodgkin; by the countenance becoming pale and anxious, the pupils contracted; the tongue deeply furred, brownish in the centre and towards the root, with incessant talking, and great irritability; subsultus tendinum; constant low muttering delirium, which before death passes into coma and convulsions. In some rare cases the third stage is only marked by tranquillity, which precedes sleep, when recovery almost always occurs.

It must be admitted that this division into stages is arbitrary, and that cases seldom occur which present all the symptoms in the order they have been described. Sometimes a few of them may be absent, while in others various modifications may take place. The intensity of the disease also may differ; in some being so remarkably slight, as scarcely to be distinguished from simple nervous tremor, while in others the second stage may be very violent, and approach somewhat that of the first form. It rarely happens that the physician has an opportunity of witnessing the disease in its first stage, as the symptoms in general are not thought sufficiently important to demand medical interference, and in many cases, particularly those which occur after a debauch, they are not observed, the malady commencing with the second stage. The general duration of delirium tremens is three or four days, but it occasionally continues longer, even when the disease is well manifested. When the first stage is prolonged, and the course of the disorder is gradual, we can understand that it may continue for several weeks; but when it is accompanied with the more violent symptoms, they are rarely present more than four days, though in some instances they have been prolonged to six.

Anatomical characters. The appearances which have been discovered on dissection of those who have died while labouring under the disease, are by no means uniform. Sometimes congestion has been found; sometimes effusion of serum in the ventricles, and in the cavity of the arachnoid; in many cases no morbid appearance whatever can be detected. Guldberg found a deposit of lymph between the membranes of the brain a common appearance, and an injected state of the arachnoid is not unfrequent. In a case of delirium tremens examined by M. Calmeil, the cortical substance was found of a slight violet tint; the medulla oblongata, to a level with the third and fourth ventricles, was softened, and of a rose tint. In a man who died comatose four days after he was admitted into the hospital in a state of drunkenness, and with other symptoms resembling delirium tremens, Morgagni reports (*Letter* 14—258.), that there were fibrinous concretions in the sinuses of the dura mater; the arachnoid was injected, and the pia mater infiltrated with serosity; there was much serum in the lateral ventricles, and the base of the brain was softer than in its natural state. These morbid appearances may be considered accidental, and only show that they may be occasionally found connected with this as with other diseases of the nervous system. The internal surface of the stomach in some cases presents an appearance of chronic gastritis, the villi being effaced, and the mucous membrane thickened or softened. The liver has occasionally been found enlarged, granulated, and of a yellow fawn colour, or more or less altered by the fatty degeneration. These appearances are accidental, but may explain peculiar symptoms in different cases.

Nature. It is a disputed question whether delirium tremens depends on arachnitis or cerebral congestion. In the first form we observe that the cerebral symptoms are connected with increased vascular excitement, while in the second the vital actions are depressed, so that this disease, like congestive cephalalgia, apoplexy, and other nervous affections, may depend upon the same pathological condition of the brain, although the states of the system connected with it are widely different. The congestion is in the one case of an arterial, and in the other of a venous character, and both, by producing partial pressure and augmented action, may give rise to cerebral symptoms of the same kind: we are consequently induced in the majority of cases to refer the symptoms to congestion, although we do not mean to deny that in some instances inflammation may have existed, as shown by the occasional discovery of coagulable lymph after death.

What influence the action of the alcoholic poison has upon the system is as yet a matter of conjecture. It is natural to conclude, that the peculiar symptoms which distinguish this disease from the other kinds of delirium, are caused by some impression upon the nervous mass. In various animals poisoned with spirit by Dr. Percy, he was enabled to procure alcohol from the brain after death, as well as from the brain of an individual who died from excessive drinking. It may be inferred from the numerous experiments he has performed, that alcohol has a tendency to accumulate in the brain and liver. But how far this circumstance, if true, may explain the symptoms of delirium tremens, is unknown. It is probable that the alcohol was contained in the blood or serum effused; and when other poisons are taken (opium, for example), a portion of it may be contained in the fluids. But whether even then it acts directly by stimulating the nervous mass, or indirectly by rendering the whole system morbidly irritable, cannot be determined. At present our knowledge is speculative, and we conclude this unsatisfactory subject by acknowledging our ignorance, and impressing the necessity of further investigation.

Diagnosis. The two forms of delirium tremens may in general be readily distinguished from each other, especially when the previous history of the case is known. The first is recognised by its coming on shortly after a fit of intoxication, or a dose of opium; by the pulse becoming strong and full, the head and skin hot, the face flushed, the eyes injected, the tongue dry; by the violent delirium and constant confusion of ideas, and strongly marked vascular excite-

ment of the system. The second form, on the other hand, is known by its being usually the result of habitual stimulation; by the pulse being small and quick, the extremities cold; by the delirium being in general unaccompanied by violence; by the confusion of ideas being only occasional; and by the depressed vascular action. It is often difficult to distinguish the first form from phrenitis. If, however, the symptoms arise soon after intoxication, and the trembling of the hands be present, these circumstances should induce suspicions in the mind of the practitioner. The latter symptom, however, may not exist, and the only distinction is the knowledge that the fever, impatience of light and noise, turgescence of the eyes, and flushing of the face, are not so violent in delirium tremens as in phrenitis; that in the latter headach is a leading symptom, whereas in the former it is rarely observed. The second and third stage of the second form is readily distinguished from phrenitis by the quick and small pulse, the moist state of the tongue, tremor of the hands, desire of change, pale countenance, damp and relaxed skin, partial preservation of intelligence, giving intelligent answers to questions, &c. The same circumstances combined with the previous history will readily distinguish delirium tremens from febrile delirium.

Delirium tremens is with great difficulty distinguished from some form of mania, especially when there is no trembling. The mental aberration may be distinguished from that of ordinary insanity by its being changeable, and not confined to any particular train of ideas. In mania rational answers are never given, and the symptoms increase on the approach of daylight, while in delirium tremens they are augmented at night; the patient generally becomes more tractable under mild exhortation. The expression of countenance, also, in these two diseases is very different, and may be readily distinguished by an experienced eye. It must be acknowledged, however, that the diagnosis is often very difficult, and all doubtful cases should be carefully watched for several days, and every means taken to learn the previous history before forming a decided opinion.

Prognosis. The first or second attack is rarely fatal; its frequent occurrence, however, weakens the system; and, if there have been repeated attacks, the prognosis should be guarded. In old persons, also, of weak constitution, the occurrence of this disease must be looked upon as more serious than when it occurs in the middle-aged and strong, or in young persons. Dr. Ware of Boston considers that the disorder runs a certain course, and terminates in death or recovery, without in any way being influenced by remedies. Whether this be true or not, our prognosis must be guided in a great degree by the apparent strength, age, and previous habits of the patient, whatever be the treatment pursued. The *unfavourable* symptoms are subsultus tendinum; coldness of the whole surface, with clammy sweats; non-uniformity in the contraction of the pupils; great frequency and threadiness of the pulse; brown and dry tongue, &c. The *favourable* signs are, sound sleep; diminution of pulse, and gradual abatement of the delirium and other symptoms.

Treatment. From what has been said of the symptoms and pathology of the different forms of delirium tremens, it will be evident that they require two distinct modes of treatment. The necessity of establishing two forms will now become apparent as a guide to practice, inasmuch as some physicians have treated successfully this disease by one line of treatment, while others have been equally fortunate by adopting an opposite one. This contradiction evidently arises from their not having distinguished the two forms under which the disorder may occur, a circumstance that at the same time reconciles the conflicting opinions, and points out how such discrepancies are in future to be avoided.

In the first form of delirium tremens, if the pulse be strong, the head hot, the face flushed, and there be much violence, we must relieve the congestion of the brain by general or local bleeding. Care must be taken to watch the effect of the loss of blood on the pulse, as it will be found that in many cases

the abstraction of a few ounces will accomplish all that is necessary. Unless the indications for bleeding, therefore, are very well-marked, it will be better to combat the increased action by other means. Active purgatives are in this point of view of great service, and may be repeated with safety. They should be mixed with the volatile oils and preparations of ammonia or of aromatics, in order to guard against any sudden depression. Injections also should contain, in addition to any purgative medicines that may be found necessary, a portion of assafœtida, turpentine, and other stimulating drugs. Cold may be applied to the head in the form of affusion, or by an evaporating lotion frequently applied. If the skin is dry and hot, sponging the surface of the body with tepid water will produce much relief. Antimonials, given in nauseating doses frequently repeated, will also powerfully conduce to diminish the vascular excitement, on which the symptoms depend.

When the disease comes on during a debauch, or shortly after, and there is reason to believe the stomach contains alcoholic fluids, emetics should be prescribed, or if necessary the stomach pump may be introduced. The same measures should be adopted when the disease arises from an over dose of a narcotic drug. When, however, the symptoms have existed for some time, these remedies should not be employed, as their action tends to favour the cerebral congestion that may already exist.

In the first stage of the second form, the symptoms generally yield to the administration of opium, in small frequently repeated doses. Ten drops of the solution of muriate, acetate, or meconate of morphia, laudanum, or Battley's sedative solution, may be given every two hours in camphor mixture. Camphor and ammonia in larger doses, or sulphuric æther and the aromatic spirits of ammonia, may be mixed with the opiates if the depression appear to be great. Should there be nausea or vomiting, the two last remedies, or effervescing draughts combined with the opiates, may be used. These remedies may also be given in the form of injection; opium mixed with camphor, assafœtida, and other stimulating drugs in appropriate doses, being thrown up the large bowels. Care must be taken, while this plan of treatment is adopted, to keep the bowels well open, in order that the opium administered may not produce costiveness, and because the accumulation of fecal matters in the intestines will undoubtedly augment, and aggravate the symptoms. Dr. Copland even considers, that concretions of vitiated bile in the gall bladder and hepatic ducts, have favoured the supervention of the malady. He has observed dark, offensive, bilious evacuations after cathartics have been repeatedly administered, even in cases where the bowels had been relaxed. The administration of purgatives, indeed, is by most writers considered of great importance, and we should therefore, at as early a period as possible, administer active aperients combined with aromatics and opiates, as above recommended. Two or three drops of croton oil made into an emulsion, with one or two drachms of the *Mist. Guaiaci*, and fifteen or twenty drops of laudanum, followed in two or three hours by an enema, with assafœtida or turpentine, will generally in a short time produce one or more copious discharges. Dr. Copland recommends a bolus, consisting of ten grains of calomel, with as much camphor, and a grain of opium in conserve of roses, followed by a warm stomachic and aperient draught, and in an hour or two by an enema. Either of these will sufficiently unload the bowels, and it may be necessary to repeat them while the opiates and stimulants are employed, especially if, from the appearance of the stools, there be any probability of the biliary secretion being obstructed.

Though the use of the accustomed stimulus ought never to be relied on as a means of cure when the depression is extreme, and there is great exhaustion, especially in old and habitual drunkards, or opium-eaters, moderate quantities may be allowed, in conjunction with tonics and aromatics. The quantity should after a time be gradually diminished, but the effect of this diminution should be watched. In some cases the warm bath is serviceable in inducing tranquillity; its beneficial effects, however, are more marked in the next stage.

Blisters to the head and nape of the neck have been recommended; it is only, however, in constitutions much depraved and debilitated, that they can be employed with propriety. The above treatment judiciously employed and modified according to the age and strength of the patient, will in the majority of cases prevent the further progress of the disease, induce sleep, and restore the individual to perfect health.

The treatment of the second stage, which is most frequently met with in practice, is to be conducted on the same general principles as the first. Purgatives are to be employed even more actively; and the first object of the physician, if not called in until the disease is advanced, should be to evacuate the bowels by the means before recommended. The principal indications in this stage are, to remove the irritability and to procure sleep; and with this view opium is to be given in full doses, either alone or in conjunction with camphor and ammonia. One or two grains repeated every three or four hours, or four and five grains given at bedtime, will in general be sufficient. Much larger, and even enormous doses (ten to twenty grains of solid opium every two hours), however, have been recommended by Drs. Brown, Jackson, and other American physicians; but it is very probable that all the good effects of which opium is susceptible are produced by the doses we have mentioned; and that, if much larger quantities are given, they tend to produce convulsions, paralysis, and coma, which, as remarked by Dr. Wright of Baltimore, may readily be mistaken for the fatal symptoms of the disease. Many cases occur undoubtedly, which require larger, and some will do well with smaller doses, so that the physician must use the remedy according to the effect it produces, and the circumstances of the case. If small doses are employed, it will be useful to increase the quantity at night, and to favour sleep by removing the light, and guarding against every interrupting cause. We have seen several cases in which half a drachm of laudanum had been given every two hours, for two, three, or even four days; and when, on increasing the dose in the evening to four grains of solid opium, and enforcing absolute tranquillity in the room, sleep, followed by recovery, was induced. Sometimes the stomach is very irritable, and the medicine is rejected by vomiting. In this case a small quantity of sulphuric æther, or of Sp. Ammon. Co. with water, or the effervescing draughts, may form the vehicle for its administration; it may also be given in the form of injection. When any tendency to sleep is manifested, great care must be taken by the attendants to favour it as much as possible; and should the slumber appear to be disturbed, or the patient wake up alarmed, a small quantity of warm negus, or mulled wine, should be given with a moderate dose of laudanum, which will often induce long and refreshing sleep. The doses of opium should then be discontinued. When there is much debility, with a frequent small pulse, as is often the case in old persons and confirmed drunkards with broken constitutions, the opium should be combined with a moderate quantity of wine, or the accustomed stimulus, which when the more urgent symptoms have disappeared, should be gradually diminished.

The same kind of treatment is necessary in the delirium tremens occurring after wounds and operations. An injection containing fifteen or twenty drops of laudanum was considered by Dupuytren highly serviceable in cases of delirium traumaticum. But when the pulse is increased, the skin hot, with sense of weight or heavy pain in the head, and symptoms of increased vascular action, it may be necessary to employ some of the depleting measures recommended for the first form of the disease, viz. local bloodletting, cold to the head, active purgatives, antimonials, &c. Great caution, however, is necessary not to carry their employment too far. In this stage the warm bath at the temperature of 90° will often relieve the patient, and assist in procuring sleep.

Other remedies have been recommended, some of which may be tried either alone, or conjoined with those already mentioned.—hyoscyamus, digitalis,

hydrocyanic acid, musk, ox-gall, &c. It will rarely be found, however, that these succeed when the others have failed.

It will be necessary to subdue any violence or indisposition to confinement that may be exhibited. We should endeavour to do this by a firm and temperate line of conduct, rather than by coercive measures; and whenever the wishes of the patient are reasonable, and do not lead to injurious consequences, they should be gratified. It must be remembered, however, that danger may result to the individual, or to others, by placing too much confidence in him, and at no time should the patient be left alone, or under circumstances where there are no ready means of controlling the violent paroxysms. In hospitals it may be necessary to apply the straight waistcoat, but in private practice it will be sufficient that proper attendants sit by the bed night and day, prepared to act on any emergency.

In the third stage all remedies will in general be useless, as the exhaustion which characterises it is usually too great to be relieved, and when it comes on after the judicious use of remedies in the second period, the case may be looked upon as hopeless. Should the former treatment, however, have been improper or inefficient, it is still possible to produce a change for the better. With this view, large doses of stimulants, such as ether, ammonia, camphor, &c. should be given, the hair should be removed, and a blister applied to the scalp or nape of the neck, and a sinapism to the epigastrium. Stimulants and cordials, in extreme cases, should at the same time be administered, and stimulating liniments, with mercurials, rubbed upon the inside of the thighs. If there be not too much exhaustion, the warm bath may be employed, and indeed every measure that can stimulate the sinking vital powers, remove the congestion in the brain, and favour the absorption of serum that may probably be effused.

During the course of the disease, the patient generally feels no disposition to eat, and very often loathes all kinds of food. Light nourishment, however, should be offered occasionally; it may consist of arrow-root, tapioca, sago, &c. mixed with a little brandy or wine. During the convalescence, the diet should be nutritive but light, with a small quantity of porter or wine, according to the previous habits of the patient. The state of the secretions and excretions should be regulated, if necessary, by appropriate medicines, and the tone of the stomach improved by tonics.

Every opportunity should be seized of pointing out to the individual the evil consequences of an indulgence in those habits which have brought on the disease, although experience has proved that the most convincing arguments and earnest representations seldom produce the desired effect.

CEPHALALGIA.

General symptoms. — Causes. — Morbid anatomy and pathology. — Varieties. — Diagnosis. — Prognosis. — Treatment.

THE term Cephalalgia (from κεφαλή, *caput*, and ἄλγος, *dolor*) simply implies pain in the head. In its various forms it is, perhaps, one of the most frequent maladies to which humanity is subject, and often constitutes a disease of the most distressing and fatal kind. This affection appears under so many forms, is produced by such a number of causes, is in its nature so variable, and is connected with such different morbid lesions, that a perfect knowledge of it, with a view to treatment, is obtained with the utmost difficulty. Indeed, as has been well-observed, "there is no disorder which tries the science, expe-

rience, powers of observation, and acumen of the physician more than this does, and there is none that requires a more precise estimate of the pathological conditions on which it depends, as a basis for safe and successful indications of cure." (*Copland.*) This, indeed, will be evident when we reflect that it is not only a disease *sui generis*, but one of the most common symptoms of numerous others; that a knowledge of its pathology involves an acquaintance with the whole morbid anatomy of the brain, and that the indications it furnishes for an accurate diagnosis in diseases of this organ generally are of primary and essential importance.

The *characters* and *symptoms* of headach are very variable, but demand great attention with a view to the proper treatment. As regards intensity, the pain may be so slight as scarcely to be noticed, and may vary in this respect, until it becomes so severe as to render the patient almost maniacal. In its situation it may be apparently near the surface, or deep-seated. Sometimes the pain is diffused, so that it can be ascribed to no particular place, or it may occupy only a part more or less circumscribed, such as the forehead, temples, occiput, or vertex. When limited to one side of the head, it is denominated *hemierania*, and vulgarly *megrim*; when confined to a small spot, so that it can be covered with the finger, *clavus*; when under the eyebrows, *suborbital*; when in the ear, *otalgia*, &c. In character it may be described as dull, heavy, indistinct, numbing, pricking, compressive, constrictive, tensive, acute, tearing, splitting or bursting, darting, lancinating, plunging, cutting, gnawing, boring, throbbing, &c. Some persons state that the head appears to be breaking open, others, that the pain resembles continued strokes on the cranium made with a hammer, or as if wedges or nails were driven into the brain. In its approach, headach may be sudden or gradual, in duration variable, from a few minutes to several years, and in the latter case may be continued, remittent, or intermittent. It may be accompanied by several abnormal sensations, such as giddiness, a feeling of sinking and dread of falling, coldness in the head, sleepiness, stupor, or, on the other hand, great wakefulness. There are often various noises in the head, as whistling, humming, ringing, buzzing, drumming and detonations; different affections of sight, as ocular spectra, *muscæ volantes*, dimness, black spots, bright rings, sparks, &c.; and more or less obtuseness of taste and odours. General sensibility may be augmented, so that the slightest contact causes great agony; the scalp, in particular, is often excessively tender to the touch. Sometimes it is diminished or partially destroyed. The muscular system may be affected with fatigue, prostration of strength, soreness, shivering, pain in different regions, sometimes cramps, pricking, or there may be convulsions and more or less paralysis. The intelligence is often affected. The patient may be hypochondriacal, and have his usual spirits depressed. There is melancholy and moroseness; he is indifferent to circumstances which, if in good health, he would have thought important, and incapable of using mental exertion. He may seek repose, silence, solitude and obscurity, or, on the other hand, society, noise, music, and active occupations.

The collateral symptoms should also be attended to. The face is sometimes hot, flushed, and swelled, or pale, cold, livid, and sunk; the eyes may feel heavy or painful, and appear injected or suffused; one or more of the teeth are occasionally painful; the skin of the cranium or forehead may be hot and more or less injected; sometimes there is discharge from the ear, and occasionally tenderness on pressing the cervical vertebræ. Sometimes the circulation is increased, the temporal and carotid arteries beating with violence; at others, the pulse is small, hard, and weak, and the veins of the head and neck occasionally swollen. There may be thirst, loss of appetite, and disgust for food; acidity and flatulence of the stomach; eructations, nausea, and vomiting. The urine may be pale and clear, or loaded, depositing a copious sediment. The bowels are often costive and deficient in biliary secretion, the skin dry or unusually moist, &c.

Causes. Women are more liable to headach than men, on account of their having a higher degree of nervous irritability and delicacy of constitution. Their sedentary life also, and the great changes produced in the system by the flow of the menstrual fluid, particularly if it be retarded, increased, or diminished, render them peculiarly predisposed to this malady. Some physicians, as Georget and Calmeil, suppose headach to be hereditary, and that it may be transmitted by the father or the mother for several generations. We know nothing certain, however, regarding this point. The other causes which predispose to Cephalalgia, are a too early or long continued use of the mental faculties; unrestrained indulgence in the passions; mental anxieties; too eager pursuit of business, or of gain; full living, and a consequent state of plethora; or, on the other hand, an insufficient diet and anæmia; the scorbutic diathesis; depressing circumstances; pregnancy; indolence; indulgence in bed; neglect of exercise in the open air; wearing a large quantity of hair; intestinal worms; abuse of mercurials; the presence of other maladies, as rheumatism, gout, syphilis, &c.; obstacles to the free course of the circulation from morbid alterations, in the heart, aorta, lungs, or other organs; venereal excesses; masturbation; involuntary seminal emissions, &c. The exciting causes are numerous; such are the abuse of vinous or spirituous liquors, sometimes coffee; errors in diet, especially too great a quantity or variety of food, especially of indigestible, rich, or heavy articles; inspiration of deleterious gasses, fumes of charcoal, miasmata, mephitic vapours, impure air of crowded or insufficiently ventilated rooms; odour of various substances, particularly turpentine and oil paint; sleeping in apartments containing plants in flower; suppression of accustomed discharges, as epistaxis, the menstrual secretion, or hæmorrhoidal flux; losses of blood; spontaneous or artificial leucorrhœa; supine posture with the head low; a tight cravat, or straight corset; sudden vicissitudes of temperature, or of the weather, especially by northerly or easterly winds; abrupt changes in the electrical states of the air; prolonged or excessive lactation; low diet and prolonged fasting; the various depressing passions, as alarm, fear, grief, anxiety of mind; want of sleep; inordinate mental or physical exertion; use of tobacco, digitalis, opium, belladonna, aconitum, and other narcotic drugs, especially in certain idiosyncracies, or in large or unaccustomed doses; caries or irritation of the teeth and gums; costiveness or constipation; the irritation of morbid secretions and fæcal matters retained in the bowels; exposure to cold and humidity or to currents of air; uncovering the head when in a state of perspiration; exposure to the sun; damp or insufficient clothing. Finally, headach may be symptomatic of other diseases, as of fever, phrenitis, coryza, congestion of the lungs, hypertrophy of the heart, the presence of worms, inflammation, various diseases of the eye, &c.

Morbid anatomy and pathology. Cephalalgia may be occasioned by every species of change to which the structure of the brain is liable, and consequently its morbid anatomy comprehends a knowledge of all the abnormal alterations which have been found in this organ. On the dissection of individuals who have died labouring under the most distressing headachs, have been found worms in the frontal sinus; caries of the ethmoid and other bones of the cranium; collections of pus in the nasal cavities; fibrous tumours formed in the dura mater, together with ossifications in different portions of that membrane; serous effusions into the ventricles and cavity of the arachnoid; indurations and softening of the substance of the brain; encysted abscesses, hydatids, and apoplectic cicatrices in the cerebral lobes or cerebellum; different kinds of tumours occupying various portions of the organ, as the tuberculous, cancerous, albuminous, steatomatous, &c. and lastly greater or less congestion of the vessels. Numerous instances also have occurred where no morbid change could be detected, and yet the pain has been very intense. Under any circumstances it is difficult to explain in what manner headach is produced, the brain having been disorganised to an immense extent by large chronic abscesses when no material suffering has been occasioned, and when even cerebral lesion

was not suspected; while the results of numerous experiments on animals, as well as the infliction of severe wounds on the human brain, have shown that the structure of the cerebral lobes and cerebellum is not endowed with sensibility. The slow progress, however, of some morbid growths is well-calculated to obviate irritation, inasmuch as the brain becomes accommodated to them, its structure is gradually absorbed to make room for their development, and the circulation is carried on in the healthy portion without any material derangement. Thus in twenty cases of fungus of the dura mater published by Louis (*Mém. de l'Acad. Roy. de Chir.* t. 5.) there were only three with cerebral symptoms of any kind; and chronic abscesses, cysts, hydatids, exostoses, &c. have often arrived at an enormous size without having produced any serious alteration in the functions of the brain. But these evidently render the organ more disposed to sudden alterations in its circulation, as is manifested by the sudden and rapid effects occasioned, whenever any cause excites or diminishes the heart's action. Some morbid changes, however, appear to produce a greater irritating effect than others, such as cancer, encephaloid and malignant tumours of the nervous structure and acute softening. The pain accompanying these is more prolonged, deep-seated, and of a peculiar character. The pain itself is generally referred to the external surface of the head, and often appears to the patient connected with the bones, a fact which M.M. Jolly, Georget, and Calmeil, explain by supposing that in this, as in other parts of the system, impressions are attributed to the extremities of the nervous fibres.

Numerous observations have established the fact, that headach and a greater or less disturbance of the functions of the brain, is often accompanied by more or less derangement of other organs, as the stomach, heart, liver, uterus, &c.; and diseases in these last often apparently occasion affection of the first. This has been generally attributed to sympathy, a term, however, by which we can only express that the altered functions of one organ *coincide with* the deranged functions of another, without any obvious cause. As our knowledge of pathology increases, the number of these sympathetic diseases diminishes; and although much difficulty attends the investigation, when connected with headach, we anticipate that at some future period more precise ideas will be entertained of its pathology. At present it may be considered a law in the animal economy, that pain cannot be produced unless the animal is conscious of the application of a stimulus producing irritating impressions on a portion of the nervous system; that a certain degree of pressure is capable of producing this irritation, which may exist without causing any structural alteration; and that consequently, when no organic change can be discovered, headach is always occasioned by pressure, which probably arises from local congestions of blood, although the causes tending to these, or the means by which they are produced, are yet unknown. On the other hand, why the stomach, heart, liver, uterus, &c. should be affected from diseased brain, is even more difficult to explain. We know that a certain connection exists between these viscera and the centre of the nervous system; but why in some cases one should be acted on in preference to another is inexplicable. The numerous theories which have been formed regarding the functions of the sympathetic system of nerves by no means remove the difficulty. Did we even adopt the theory regarding the influence of the ganglial nerves over the bloodvessels, we are still at a loss to account for the production of functional changes in one organ, independent of or unconnected with others. We may indeed suppose, that an irritation exists at the origin of the par vagum which is capable of explaining some of the symptoms, as gastralgia, nausea, vomiting, loss of appetite, &c.; and we consider it much more probable, that these nerves furnish the communication which exists between the brain and stomach than the sympathetic. But why should the respiratory system in these cases escape? Are we to imagine the morbid alteration limited only to those fibres which are distributed to the stomach, while those going to the lungs are unaffected? Mature consideration of this

subject has however convinced us that, in the present state of science, no positive opinion can be given concerning these points.

Varieties. An arrangement of the different forms of headach is, as has been stated, of great importance with a view to treatment. For this purpose, however, while we regard the symptoms as being the chief point to be attended to, it is of equal importance not to lose sight of the pathology of this affection, in order that it may be reduced, if possible, to the general laws which govern all the operations of the nervous system. Neither pathological or semeiological principles, however, can in this case guide us alone, and we are therefore under the necessity of arranging the different varieties according to both, as far as they are known and distinct. Without entering then into a criticism on the different classifications of headachs, we consider that, in a pathological point of view, and for practical purposes, this disease may be divided into seven varieties:—1. The *congestive*, from congestion occasioned by increased or diminished vital action of the heart and bloodvessels. 2. The *inflammatory*, from inflammation in the membranes or substance of the brain. 3. The *sympathetic*, from disorder of the digestive, biliary, uterine, urinary, and other organs. 4. The *organic*, from structural change of the bones of the cranium, membranes, or substance of the brain. 5. The *neuralgic*, from affection of the nerves distributed to the integuments. 6. The *metastatic*, from the metastasis of disorders; and, 7. The *intermittent*, occurring at stated periods. We shall notice each of these in succession.

Congestive headach. It is very probable that every species of headach, except the organic and neuralgic, depends upon a greater or less degree of congestion of the vessels of the brain. The variety which we are now considering is characterised by the congestion being primarily cerebral, and unconnected with any other affection. It must be remembered that this pathological state may be produced in the brain by an increase or diminution of those vital actions by which the equilibrium of the circulation within the cranium is maintained; and hence all those causes which diminish and increase the action of the heart and bloodvessels may induce it. The headach depending upon depressing causes, and accompanied by general irritability of the system, is the *nervous headach* of some authors, and the congestion in these cases, if increased, may determine to syncope; but, when connected with increased action, the congestion if continued may occasion apoplexy. We shall have an opportunity, under the head of *Treatment*, of alluding to the great importance of attending to the two different kinds of congestive headach. The cerebral symptoms in both will be found to be nearly the same; thus the pain may be acute, lancinating, or attended with a sense of heaviness; there is vertigo; and the sight is dim or impaired, dark spots or meshes move before the eyes; there is occasionally buzzing, ringing, and humming noises in the ears, and other affections of the special senses. The other symptoms, however, are much opposed; thus the pulse may be small and weak, or full and strong; the face pale and sunk, or flushed and tumid, &c.; other symptoms may be present, arising from more or less derangement of other organs, of which we have already spoken.

Inflammatory headach. This variety of headach arises from inflammation of the membranes or substance of the brain, and the symptoms are those which characterise those affections, to the description of which we refer.

Sympathetic headach. By this term must be understood headach apparently depending on disease or derangement in the functions of another organ. Pathologically it cannot be separated from the congestive variety, but in this case it is secondary. If the stomach is deranged, and nausea or vomiting is a prominent symptom, it has received the name of *sick headach*; if the liver or biliary apparatus is affected, it has been called *bilious headach*; if it accompanies indigestion, it is known by the name of *dyspeptic headach*. It may also be connected with derangements of the uterine and urinary organs. When headach coincides with derangements in other viscera, it is often difficult to discover the primary affection. It frequently happens in practice that remedies are directed

to cure disorder of the stomach as if it were the primary malady, although it may have been produced by organic disease of the brain. Sufficient attention has not been paid to this point, although of the greatest importance, as some remedies prescribed for a stomach affection, as for instance emetics, would be highly dangerous did any structural change exist in the brain. We shall again allude to this subject under the head of *Diagnosis* and *Treatment*.

Organic headach. We have already stated that this variety may be occasioned by any of the numerous alterations to which the bones of the cranium and the membranes or structure of the brain are liable, and that there is much difference between the results occasioned by a slow or rapid formation of these. When the brain is the seat of the morbid structure, the pain is fixed to one place, more continued and deep-seated, although intermissions are not uncommon, and sometimes it remits without being entirely absent. It often produces derangement of the stomach, but without any apparent cause connected with that viscus itself. If the pain is occasioned by disease of the cranial bones, it is confined to one spot, and appears more superficial: if the periosteum be affected, its character, according to Dr. Burder, is tensive. The advanced stages of tumours and other alterations in the brain are marked by convulsions, neuralgic pains, paralysis, and affections of general and special sensibility.

Neuralgic headach. For information on this variety the reader is referred to NEURALGIA.

Metastatic headach. This variety is usually observed in persons of a rheumatic and gouty diathesis. The *rheumatic* headach is simply rheumatism affecting the aponeurosis of the occipito frontalis and temporal muscles. It depends upon the same causes and is cured by the same means as rheumatism in general. It is rarely, however, present before this disease has been manifested in some other part of the body. The *arthritic* headach is not uncommon in individuals of a gouty diathesis, particularly if they have neglected the means necessary for developing a confirmed paroxysm. It is often very dangerous, and may be occasioned by a metastasis of gout to the brain, although in some instances it is premonitory of a regular attack. If not removed, it may terminate in apoplexy.

Intermittent headach. This form of the disease attacks persons subject to periodic fevers. It may return daily, or even twice in the course of twenty-four hours, for a certain time, or assume a tertian or quartan type. It may be limited to a half or smaller portion of the head. When the brows are especially affected, it is called *brow ache*. The character of the pain is often neuralgic. It is most common in spring and autumn; prevails in damp or marshy districts: and is caused by exposure to cold, terrestrial exhalations, &c.

Diagnosis. We are persuaded that, generally speaking, very little care is taken to distinguish the different varieties of headach, although in treating nervous diseases this is the most important subject that can occupy the attention of the practitioner, as it often indicates the nature of the malady, influences his prognosis, and directs his treatment. Some of the varieties are readily distinguished; others, however, are determined with more difficulty, and in certain cases require the greatest patience and power of observation on the part of the physician.

The *congestive headach* may be known by the occasional vertigo and a sense of fulness or weight in the head. The pain is acute, or dull, throbbing or gravitating, not fixed to one spot or long continued. It comes on gradually, reaches its highest intensity, and then slowly declines. These changes are often very quick and not observed. In some cases the pain is relieved by the horizontal, in others by the upright posture: it is often produced by stooping, sleeping with the head low, wearing a tight neckerchief, stays, &c. We have said that this variety may be divided into two kinds, distinguished by the debilitated or plethoric state of the system. The first is recognised by the feebleness of the pulse, paleness of the countenance, chlorotic habit, general irritability, by its occurring in females, or, when it occurs in males, it is often the

indication of dissipated habits, and exhaustion of the constitutional powers. In the second kind, on the contrary, the pulse is full, there are symptoms of repletion and plethora, and this form is generally met with in males or in persons of either sex habituated to full living. The congestive variety of headach is generally more severe either in the morning or the evening; and, in order to be distinguished, should be carefully compared with the diagnostic symptoms of the other varieties.

The *inflammatory headach* is distinguished by the strong pulse, heat of surface and general fever, flushed countenance, suffusion of the eyes, and sometimes intolerance of light. The pain is very acute and throbbing, accompanied with a pulsating noise in the ears or temples. The patient is excited, restless, watchful, and irritable: in the more advanced stage convulsions and delirium appear, accompanied by symptoms which indicate inflammation of the brain and its membranes.

It is of great importance to distinguish *sympathetic headach*, especially from the organic. When it depends upon derangement of the stomach, liver, or alimentary canal, it may be known by the foul state of the tongue, and improper performance of the digestive functions. The pain is often diffused over the head, but sometimes more circumscribed, usually affecting in such cases the forehead or one temple, particularly the left. In character it is either dull, heavy, or oppressive, or acute, sharp, and darting. The headach is usually present when the patient wakes in the morning, and in slight cases generally disappears after breakfast, or even earlier. In general there is little appetite in the morning, and the too frequent practice of having recourse to alcoholic stimulus, from its often giving temporary relief, increases the affection. If there is nausea, the headach generally continues till vomiting takes place, when the remains of an indigested meal, or ingesta mixed with bile of a yellowish or greenish colour, is discharged, to the great relief of the patient, after which the symptoms disappear for a time, a circumstance that does not take place in the organic headach. The sensation attending the vomiting is also very different, being often preceded by unpleasant taste in the mouth, eructations, and flatulence. In general it returns the same day, and runs a similar course for some time, until the diet is properly regulated, and purgatives have been taken. Sometimes it follows a principal meal, particularly if any indigestible substances have been indulged in. Many idiosyncracies exist in this respect, the headach in some being invariably occasioned when certain articles of food have been inadvertently indulged in. The headach occasionally comes on at a certain period, perhaps two, three, or four hours after a meal; and in this instance, according to Drs. Warren and Paris, it arises from irritation of the duodenum. In all these cases the pulse is generally slow and weak, sometimes frequent and small; the tongue is white or yellow, more densely furred towards the root; and the bowels usually costive. The group of symptoms now detailed will sufficiently distinguish dyspeptic and bilious headach. The cephalalgia to which hypochondriacs are subject is generally to be referred to the same variety. In women, headach is often combined with hysteria, and depends upon some derangement in the uterine system. In this case, it is often confined to a small spot, and in its character resembles a nail pressing upon or driven into the brain. The attention of the physician should here be directed to the menstrual discharge, which will generally be found irregular, painful, scanty, or excessive. Leucorrhœa also, combined with flatulence and more or less disorder of the alimentary canal, may be present. It is remarked by Jolly (*Dict. de Méd. et Chir. Prat.*), that cephalalgia arising from disorder of the uterine function is generally confined to the sinciput, a diagnostic symptom, however, that requires confirmation. Headach is also symptomatic of shock or mental impression. In such cases there is a sense of weight or pain in the head and sleeplessness, and often a disposition to suicide; according to the observation of M. Barbier, of Amiens, the pain is generally in the occipital region. It is often of consequence to distinguish this kind of headach, which it is difficult

to do, without being informed that some circumstance has occurred which has produced an effect on the mind; and with a view to diagnosis, inquiry on this point should be made. Headach may also arise from a host of other disorders, to which it may readily be attributed, as worms in the intestines, calculi in the kidneys, ureters, or bladder, inflammation of the spinal cord, &c.

The *organic headach* is in the early stages with great difficulty distinguished from the other varieties. A careful examination, however, into the history of the case, will enable the observing physician to learn that the pain often occurs in paroxysms without any apparent cause, and at irregular periods; that when present, it is increased by conversation and active occupations, and relieved by solitude, tranquillity, and absolute repose. It is in no way alleviated by any particular position the patient assumes, but often increased on stooping, or turning the head suddenly. The character of the pain is lacinating, or darting, apparently confined to one spot, and, if the bones are affected, is increased by pressure. If there be vomiting, it may be distinguished from that which accompanies dyspeptic headach, by its being apparently independent of any error in diet or affection of the stomach, and by its occurring when the pain is most violent, and not producing any material relief. In the advanced stages it may usually be recognised by the continuance and severity of the pain, by spasmodic twitching, greater or less imperfection or total destruction of one or other of the senses, paralysis, &c. A very cautious diagnosis should be given in the first stage of this variety, until the patient has been observed some time; the increasing number and severity of the attacks noticed, and its permanent effect on the functions of motion and sensation carefully attended to.

The *neuralgic headach* is readily known by the intensity of the pain, and its shooting or plunging character, following the course of the nerve, but sometimes confined to one spot. It is of short duration, and comes on in violent paroxysms, leaving intermissions which are sometimes considerable. Although, in this form, the digestive organs are often deranged, it may readily be distinguished from the sympathetic headach by the above characters.

The *metastatic headach* includes two varieties:—1. *Rheumatic headach* may be known by the severe aching pain, occupying the scalp, increased on applying pressure, or on the slightest movement of the muscles connected with it. It is generally increased in the evening, and is sometimes associated with the inflammatory or congestive headaches. 2. The *arthritic* form occurs in persons of a gouty diathesis. The pain is severe and attended with a sense of heat or burning, great tenderness and increased heat of the scalp, flushed countenance, confusion of thought and loss of memory, vertigo, dimness of sight, intolerance of noises, and most of the cerebral symptoms which characterise the severe forms of the congestive and inflammatory varieties. There are also furred tongue, flatulence, costiveness, unhealthy stools, and other symptoms of derangement in the digestive functions, together with scanty, high-coloured urine, which deposits a copious reddish sediment. The history of the case however, and its connection with some of the forms of gout, will readily distinguish it.

The *intermittent headach* is analogous to the neuralgic, and is distinguished by the regularity of the paroxysms. The pain is often excruciating, and is usually dependent upon the same causes that produce intermittent fever.

The *prognosis* of headach entirely depends upon the accuracy of the diagnosis. In all organic affections of the brain the result is generally fatal, although, if the symptoms are developed slowly, this may be deferred for several years, especially if judicious treatment be pursued. In cases of this variety, therefore, the prognosis will always be unfavourable, particularly if more or less loss of motion, sensation, and intelligence, be the principal symptoms. A cautious opinion is necessary when the bones of the cranium appear to be the seat of organic change. In the congestive variety, the prognosis will depend on the constitutional state of the patient. Generally speaking, however, these cases are not fatal unless symptoms of an apoplectic tendency supervene. Much caution

is necessary in giving a prognosis in the inflammatory and metastatic varieties : the arthritic, in particular, is an affection demanding a very guarded opinion ; the prognosis in the sympathetic variety will depend upon the extent to which disease affects those organs primarily disordered. If recent, and no organic disease be present in any particular viscus, a favourable prognosis may be confidently given. An opinion, however, should be offered with caution, when the stomach, heart, liver, kidney, &c. are the seat of structural alterations. The neuralgic and intermittent headaches generally admit of a favourable prognosis ; the former however, if it occurs in elderly persons of a debilitated constitution, may render any other malady under which they may incidentally labour more dangerous.

Treatment. No doubt can exist that the treatment of cephalalgia, generally speaking, has been conducted on principles which partake too much of empiricism, and that purgatives and other remedies which act on the *primæ viæ* have been too indiscriminately employed. A study of the pathology of this affection, however, must convince the practitioner that headach may depend upon states of the system directly opposed to each other ; that occasionally it is complicated with, or seems to form, part of other maladies, and that consequently its treatment must be varied according to the morbid conditions present, and the organs primarily affected. With this view a diagnosis of the varieties described is absolutely essential.

The *congestive headach* will demand two opposite kinds of treatment, according as it is connected with increased or diminished action, or, in other words, with plethora or anæmia. If cephalalgia occurs in persons of a plethoric habit of body, who are accustomed to a full diet, and take little exercise, and in whom the pulse is full and of good strength, general bloodletting is indicated, the extent of which is to be guided by the age and constitution of the patient. In strong and middle-aged persons, it should be continued until a marked effect on the pulse is produced. This should be followed by active purgatives, and antiphlogistic diet. Cold affusions on the head are also useful, combined with warm and stimulating applications to the feet. In elderly persons, or when the pulse and general appearance do not indicate the more active method of general depletion, the application of cupping-glasses to the temples, behind the ears, occiput, or nape of the neck, will often be sufficient to remove the vertigo and other distressing symptoms ; leeches may be applied with the same view. The above means rarely fail in removing the complaint, and the endeavours of the practitioner should then be directed to prevent its recurrence. This is to be accomplished by enforcing a light, abstemious, and easily digestible diet ; promoting the secretions and excretions by exercise in the open air, and, if necessary, by aperient medicines, or by a course of the natural or artificial purgative waters. The hair should be cut short, and care taken to sleep with the head and shoulders well-elevated. The occasional use of the shower bath will also be beneficial ; and, in some cases, blisters behind the ears, over the temples, and at the nape of the neck, or the tartar emetic ointment and other derivatives have been employed with advantage. When too close mental application is connected with the causes inducing the complaint, the former should be restricted or entirely broken off, and the mind relieved by travelling, light reading, and active exercise in the country, while the measures recommended for lessening the congestion, according to the age and constitution of the patient, should be resorted to. Slight attacks of this form of the disease are very common, and are in general removed by a spirit lotion applied to the forehead, an aperient, exercise in the open air, cheerful conversation, or any circumstance that distracts the attention. Sternutatories also are often instantaneously useful in light cases, by procuring defluxion from the Schneiderian membrane.

Should the congestive headach, however, be connected with an opposite state of the system, and symptoms of debility be present, then a stimulating and tonic line of treatment is to be adopted, which must be influenced by the state of exhaustion to which the patient is reduced. If this be extreme,

much caution is necessary, as irritative fever is, in such cases, readily induced, particularly in females. Small and frequently repeated doses of the Sp. Ammon. \bar{c} Tr. Lavend., or alkaline carbonates with some bitter infusion, will improve the state of the system and increase the appetite. The diet should be nourishing, at the same time light and digestible, and a glass of good wine may be taken during dinner. In this variety of headach, the bowels should be rigorously attended to. They will generally be found torpid, requiring stimulation by the resinous purgatives mixed with the aromatic roots and barks. These remedies will often be successful in ordinary cases, but if the disease continues, and there is much restlessness and watching at night, small doses of anodynes and hypnotics may be given. A pill, containing Ext. Hyos. and Pil. Hyd. $\bar{a}\bar{a}$ gr. iv, may be taken at bedtime, and in the morning a draught, consisting of Dec. Aloes Co. \bar{z} ss, Spir. Ammon. Co. $\bar{3}$ ss, Inf. Aur. Co. $\bar{5}$ vj. This prescription may be repeated several successive nights, or every other night, as occasion may require. The other anodynes and more powerful tonics may also be administered if necessary, particularly camphor, the muriate and nitrate of morphia, quinine, preparations of iron, valerian, assafœtida, &c.

Inflammatory headach demands active bloodletting and antiphlogistic treatment. (See INFLAMMATION OF THE BRAIN).

Sympathetic headach. The treatment of this variety of headach must be directed to the cure or alleviation of those maladies on which it depends. The *dyspeptic* headach of authors is benefited by all those means adapted to prevent indigestion; and with this view a light diet, regular exercise in the open air, aperients combined with tonics, and such remedies as promote the regularity of the excretions and secretions, are indicated. In some few cases leeches to the pit of the stomach, and a rigorous antiphlogistic diet, have been found useful, especially when the dyspepsia depends on chronic inflammation of the stomach. Should nausea be present, and we are sure that it is in no way connected with organic change in the brain, an emetic of ipecacuanha or tartrate of antimony, followed by copious draughts of warm water, or chamomile tea, so as to favour its action, will often temporarily remove the nausea and cure the headach. For this purpose small doses of the neutral salts will be useful, such as the sulphate of magnesia, tartrate of soda, particularly in the form of Seidlitz powders, in combination with carminatives. They should be taken every morning, and followed by exercise, to favour their operation. Other purgative preparations may be employed with the above, if necessary; such as the compound rhubarb or colocynth pills, one or more of which may be taken on alternate nights. The patient must be guarded in his regimen, avoiding repletion and indigestible substances. The amusements of a watering-place, and a course of the ferruginous or aperient mineral waters, according to circumstances, will assist in producing a cure. Should the headach come on after dinner, two or three of the pills, composed of rhubarb, aloes, soap, and ginger, in equal proportions (generally denominated the *dinner pill*), will often tend to its removal.

When cephalalgia is connected with any derangement of the biliary functions (constituting the *bilious headach*), in addition to the general treatment above pointed out, it is proper to combine with the purgatives, such medicines as have a special action on the liver. For this purpose, calomel or the blue pill may be mixed with the purgative pill masses, and given in moderate doses, according to the strength of the patient and circumstances of the case. It will be right at the commencement of the treatment to procure several copious stools, and afterwards give small alterative doses of the mercurial preparations, so as to keep up a regular action on the bowels and liver. The purgative action may be assisted, if necessary, by doses of aloes, gamboge, compound infusion of senna, and other remedies of the same class, combined with the alkaline subcarbonate and neutral salts. These latter will prove particularly useful when there is an acid taste in the mouth, or eructations. If any pain exist in the neighbourhood of the liver, increased by pressure on the substance of the organ, and the pulse is accelerated and strong, general or local bleeding is indicated, together with

antiphlogistic remedies. If gall stones, or masses of indurated bile, block up the hepatic or biliary ducts, a diluent diet, with demulcents, cooling drinks, and an alterative mercurial course, should be prescribed. Much care should be taken in such cases to examine the abdomen, and remove collections of fæces in the large intestines by emollient or purgative injections. The treatment now recommended for the dyspeptic and bilious headaches will, in general, be also adapted to the affection occurring in hypochondriacs, combined with the other means applicable to the treatment of that malady.

When headach follows the suppression of cutaneous eruptions, diaphoretics and the warm and vapour baths are to be employed. If it arise from disorder of the uterine functions, removing the original affection is the only means of permanently remedying the cephalalgia. The same may be said when it is connected with disorder of the urinary or other organs. When the teeth are decayed, extraction is necessary, or the application of remedies which alleviate the pain, as opium, creosote, &c.

The *hysteric headach* is to be combated by the use of tonics, antispasmodics, and purgatives, if necessary, according to the age and constitution of the patient. All the therapeutic remedies useful for removing the general nervous derangement tend to relieve the cephalalgia. (See *Treatment of HYSTERIA*.)

Organic headach. When we have reason to believe organic change exists in the substance of the brain, and that it is not far advanced, absolute tranquillity and the horizontal posture are necessary elements in the treatment. With this should be combined, first, general and local bloodletting, purgatives, and an antiphlogistic diet, according to the age and powers of the individual. This should be followed by various derivatives, as blisters over the temples, behind the ears, to the occiput and nape of the neck, frequently repeated, and dressed by stimulating ointments, in order to keep up a long discharge. Issues, setons, and the moxæ, may be used for the same purpose. The secretions and excretions are also to be carefully watched, and their healthy state promoted as much as possible by appropriate remedies. If vomiting is a frequent symptom, this should be relieved by some effervescing drink, or hydrocyanic acid, both which have often been useful in temporarily alleviating the distress occasioned by it. When the system has been brought low by the above treatment, a mild mercurial course may be tried, with a view of procuring absorption, or the different preparations of this drug with iodine. In general, however, therapeutic remedies only alleviate the symptoms, and by no means prevent the progress of the disease. In the advanced stage, characterised by more or less paralysis, loss of the special senses, and of general sensibility, all remedies are in general useless, and we can only lessen the distressing pain so often present by opiates and soothing remedies. When the bones are affected by a syphilitic taint in the system, remedies adapted to the cure of that malady are to be employed. If caries exist, the usual surgical treatment is to be followed. In active inflammation of the periosteum or bone beneath it, an incision through the periosteum to the bone is often followed by speedy relief.

The *metastatic headach*, including the *rheumatic* and *arthritic*, together with the *neuralgic* and *intermittent* varieties, are to be treated in the same manner as the diseases of which they usually form a part.

Although the various remedies to which we have alluded have often been found useful in certain headaches, there is great difficulty in applying them to those cases which are capable of being benefited by each respectively. Idiosyncrasy in different individuals also often baffles our investigation of the exact effect of a particular drug. In obstinate cases, therefore, we should vary the different medicines and applications, so that, without departing from the general principles which have been detailed, we may give the patient the benefit of all such means as the present state of our therapeutic knowledge, and the experience of others, teach us may possibly be successful.

EPILEPSY.

History. — *Symptoms* — *premonitory* — *of the seizure* — *consecutive.* — *Duration.* — *Causes* — *predisposing* — *exciting.* — *Varieties* — *idiopathic* — *sympathetic.* — *Anatomical characters.* — *Nature.* — *Diagnosis* — *Prognosis.* — *Treatment.*

THE term epilepsy (ἐπιληψία, ἐπιλήψις, from ἐπιλαμβάνω, to seize or attack) is applied to a disease in which there is sudden loss of consciousness and sensibility, with convulsion of the voluntary muscles, accompanied and followed by coma; these symptoms occurring in paroxysms. This disease has been described by the oldest medical writers, many of whom considered it to be induced by supernatural agency. Hence many of the names which it has received, as *morbus sacer*, *scelestus*, *demoniacus*, *deificus*, *divinus*, &c. Although Hippocrates attempted to combat the absurd opinions regarding its origin, he retained the first of these names. Since his time it has received numerous appellations. It is the *morbus Herculeus* of Aristotle; *lunaticus* of Aretæus; *comitialis* of Pliny; *sacer* and *major* of Celsus; *convivalis* of Plautus; *sonticus* of Aulus Gellius; *carducus* of Paracelsus; *analepsia* of Riverius, &c. In France it is vulgarly called *mal de terre*, *mal de Saint Jean*, *haut mal*, &c.; and with us *falling sickness*.

Symptoms. We shall divide the symptoms of epilepsy into those which precede, constitute, and follow the attack.

Premonitory symptoms. Georget says, that the premonitory symptoms do not occur in more than five cases in a hundred (*Dict. de Méd. Epilepsie*); but according to the statistical researches of M. Beau, they are observed in about half the attacks that take place. (*Arch. Gén. de Méd.*, tom. ii.) The following are the premonitory symptoms which have most frequently been noticed: pain in the head — dimness or temporary loss of sight — optical illusions — double or partial vision — strabismus — vertigo — drowsiness — noises in the ears — disagreeable odours — morbid perception of flavours — violent sneezing — hiccough — frequent yawning — flushing or unusual paleness of the face — anxiety of the countenance — increased size of the pupils, or alternate contractions and dilatations, with trembling of the iris — feeling of coldness or of emptiness in the head — perversion of character — loss of recollection — confusion of ideas — frightful dreams — disturbed sleep — feeling of increased strength — loathing of food, or great voracity and increased appetite — vomiting and eructations — involuntary evacuation of the excretions — increased sensibility of the surface — sensation of pricking or formication in the arms, legs, back, &c. — cramps — unsteady gait — desire of motion — impulse to run forwards, or to turn round, &c. A premonitory symptom peculiar to epilepsy is named the *aura epileptica*. It consists in a sensation of coldness, warmth, pain or itching, proceeding from the toes, legs, thighs, hands, arms, uterus, abdomen, stomach, breast, face, or head. If it commence in the extremities, it proceeds up the limb affected towards the head, and when it arrives there or ceases, the paroxysm begins. Sometimes it stops at the epigastrium.

It is seldom that more than two or three of the above symptoms are present at a time, but they occasionally change in the same individual. When they are felt, the patient is aware of the approaching attack, and seeks to avoid it by the use of such remedies as experience dictates. Sometimes, however, the premonitory symptoms are either so severe, or occasion so much irritability in the individual, that he drinks wine or other liquors with a view of favouring the attack and bringing it on as soon as possible.

Symptoms of the seizure. The commencement of the seizure is generally

characterised by the utterance of a scream or exclamation, immediately after which the individual falls to the ground violently convulsed. In forty-eight cases mentioned by M. Beau, in which the cry occurred at the commencement of the attack, there were no premonitory symptoms in thirty-eight. He thinks, therefore, that this symptom should be considered as an expression of surprise on the part of the patient, and not as properly belonging to the attack. (*Arch. Gén. de Méd.*, tom. ii.) Occasionally the convulsions occur before the fall, or various singular movements immediately precede it, as running forward, or turning round. One of Esquirol's cases kept turning round for several minutes, and another ran as fast as possible some distance before falling. Foville describes a case in which, after screaming, the patient took several quick pirouettes, and convulsively made numerous signs of the cross. Sometimes the patients take several short leaps resembling dancing, described by Fabricius as the *epilepsia saltator*; and Dr. Reid says, that he has often seen patients hop five or six times on both feet, with their bodies perfectly rigid, before they fell. (*Trans. of Assoc. of Phys. in Ireland*, vol. iv.) These various states are not unfrequently followed by more or less tetanic rigidity before the accession of the convulsions, and in some cases the cry, the fall, and the convulsions, succeed almost immediately each other, or appear instantaneously. Consciousness is entirely suspended, the most painful application failing to produce any sensation. In severe attacks (the *grand mal* of the French) the hair becomes erect; the forehead contracted and wrinkled; the eyebrows drawn down and approaching each other, or agitated; the eyes are prominent, sometimes fixed and drawn upwards, or rolling in the orbits; the pupils are contracted, dilated, or natural, but the motions of the iris are slow or entirely abolished; the eyelids are sometimes alternately elevated and drawn down, or half shut or open; the face is tumid, red, livid, or ecchymosed; the countenance much distorted; the lips either contracted, elongated, pushed forwards, or drawn backwards; the inferior maxilla is either drawn strongly against the superior, or the jaws are wide asunder; the teeth are sometimes forcibly gnashed or ground together, and have been broken by the violence of this action; according to Van Swieten, it has even produced dislocation of the jaw. The tongue is thrust out of the mouth, is swollen, livid, and more or less lacerated by the spasmodic action of the maxilla; the vessels of the head and neck are much distended; the carotids beat with great force; the head executes rotatory movements, or is carried forwards and backwards, or to the right and left sides alternately, and sometimes it is spasmodically fixed in one position that differs in various persons; the neck is often rigid; the trunk is either twisted in different ways, or rests tetanically fixed; the extremities are violently tossed about, while the arms strike against the chest, and the hands and fingers perform continued motions of flexion and extension, and the thumbs are permanently flexed, and the toes incurvated. The former of these symptoms has been thought by some characteristic of epilepsy.

The convulsions are usually of a tonic character, the muscular contractions being more prolonged than the relaxations, and sometimes one side of the body is more affected by them than the other, while the face is drawn to the right or left side. The respiration is at first performed with difficulty, as if a load was placed upon the thorax, and soon becomes quick, short, and irregular. The air entering the lungs is almost immediately expired mixed with a mucous fluid, sometimes tinged with blood, which is thus rendered frothy as it flows from the mouth. If it enter the trachea, a suffocating *rale* is produced, and the contractions of the muscles of the larynx are increased, so that partial asphyxia is occasioned. The pulse, at first small, becomes frequent, hard, irregular, and sometimes imperceptible; the action of the heart is tumultuous and violent, and that of the carotids increased; sometimes there is erection of the penis and emission of semen or of the prostatic fluid; occasionally involuntary discharge of the urine and fæces, the latter often accompanied with flatus; the skin is bathed with perspiration, and sometimes there is a discharge

of blood from the nose, and in a few rare cases from the ears. After a certain time these severe symptoms diminish; the convulsions gradually cease; vomiting or eructations sometimes occur; the patient takes a few deep inspirations, and the movements of the chest by degrees become natural; the pulse becomes full, soft, and regular; the distortion and discoloration of the face disappear; the eyes resume their natural aspect; and after a period of stupor, more or less continued, consciousness returns, and the patient appears as if awoke out of a deep sleep, without the slightest recollection of what has passed. A feeling of great fatigue, and sometimes of pain in the neck or occiput, is complained of; and there is an irresistible desire for sleep, from which the individual generally awakes in a natural state. Sometimes, however, the eyes remain squinting, fixed or haggard, and the pupil temporarily enlarged, with faltering of the speech, weakness of one or more limbs, and general disinclination to exertion. These symptoms gradually disappear, and the patient is restored to apparent health.

The duration of the paroxysm is very variable: generally speaking, it is from five to fifteen minutes: sometimes, however, it may be momentary, and in other cases it continues for several hours. Dr. Copland states he has seen it last more than four hours, and in one case seven hours, the seizure consisting of two fits with an indistinct interval of soporose exhaustion. The frequency of the attack is also variable; it may return many times in a day, every day or two, or once a week, fortnight, month, six months, every year or even longer, with occasional vertigo only in the intervals. The accessions in some persons recur at determinate periods, and take place at a certain time every year, month, week, or day. When it is monthly, the day of attack often coincides with a new or full moon, but by no means in a regular manner, and in females it is often apparently connected with the increased activity of the uterine functions. At other times the paroxysms appear irregularly, and there may be several attacks, with short intervals, followed by an interval of some duration. In some persons the seizure takes place during the day, at others during the night, or only during sleep, in which latter case the patients are only aware of the attack on waking in the morning. In such cases the epileptic attack seldom occurs during the day. The severity of the epileptic paroxysm varies from the slightest convulsion or spasmodic movement to the more violent and frightful seizure. When the attacks are habitually slight, the malady is named by the French *petit mal*, or *épilepsie vertige*. If the consciousness is lost only for a few moments, the eyes and features become spasmodically fixed, but the patient, on recovering, continues the discourse he may be engaged in at the time of its occurrence. In some cases consciousness is not entirely lost, the individual retaining a confused recollection of what passed during the paroxysm; in others the loss of consciousness is accompanied by slight spasms, rigidity or convulsions of a few muscles only, or of one or more limbs, which may continue a minute or two; while, in other instances, the patient does not fall to the ground, although the mental faculties may have been momentarily abolished. These slight epileptic seizures may continue for years without any change, or they may gradually increase in severity, and usher in the more confirmed attack. Not unfrequently they alternate with the more perfect paroxysms, the one or the other being more frequent. In 206 cases of this kind collected by M. Beau, the slight fits were more frequent than the severe in 115, and less frequent in 27, equally frequent in 45, and undetermined in 19.

Symptoms which follow the attack. We have noticed some of the effects which supervene on the abatement of the paroxysm; there are others, however, which appear and continue for a longer or a shorter time. Thus a severe fit may be followed by convulsions or irregular movements, more or less complete palsy or hallucinations of mind, sometimes accompanied with a kind of ecstasy, and continuing for a few hours or several days. The intelligence may be affected in different ways; there may be delirium, loss of memory, frightful dreams, watchfulness, deafness, dimness of sight or spectral images of uncertain dura-

tion. Sometimes, after the attack, epileptics are seized with a fury, which requires, restraint. This state has been denominated *mania epileptica*, or *epileptic delirium*, and usually continues from one to three days.

Various accidents occasionally occur during the fit, which may require surgical aid. Thus, patients may fracture bones, receive contused or other wounds, or they may fall into the fire or into water, or be precipitated from a window or scaffold.

The long-continued or frequent repetitions of the attacks occasion a peculiar physiognomy, which is at once recognised by an experienced eye. The features become enlarged and coarse, the inferior eyelids swollen, the lips thick, the eyes full or vacillating, the pupils dilated, the cheeks pale, certain muscles of the face convulsed, and the countenance assumes an expression of vacancy, while the finest features become plain. Epileptics have a peculiar gait; the arms and legs waste, and the body sometimes becomes fat, or in other cases emaciated, and ultimately they become either deformed and paralytic, or the limbs are powerfully contracted. The intelligence gradually becomes weak, the sensations obscured, and at length complete alienation of mind is established. Generally speaking, when the fits are severe, or even if slight and frequently repeated, these latter effects are to be dreaded. Esquirol and Foville have observed that they occur more frequently after the *épilepsie vertige* or *petit mal*. Sometimes the patient has fits of melancholy alternating with mania, either of which states may terminate in perfect imbecility. It occasionally, although rarely, happens, as noticed by Dr. Cheyne, that epileptic persons preserve their intellects to a very old age.

The frequent complication of epilepsy with mental alienation is shown by the result of 385 cases collected by MM. Esquirol and Calmeil. Of these 46 had hysteria, 12 monomania, 30 mania, 145 dementia; 34 were furious, 8 idiotic, 50 generally reasonable, but subject to loss of memory, or extravagant ideas; some had slight delirium, and all a tendency to dementia; and in the remaining 60 the intelligence was perfect. The termination in mania is apparently little influenced by the mildness or severity of the epileptic attack, the most violent paroxysms sometimes leaving the patient sane, whilst the slightest have been followed by dementia. Epileptics are much addicted to venery and to onanism, which frequently induce the disease, and favour its continuance.

The *duration* of epilepsy is most uncertain, and depends upon the cause, constitution, and habits of the patient. In young persons it may cease at puberty, or it may continue for a series of years. The individual may die during a violent fit, immediately after it, or from its effects, or death may be caused by the supervention of other consecutive diseases, generally some form of cerebral disease, or from others quite unconnected with it.

Causes. Before the age of seven years the influence of sex is not apparent, but after that age epilepsy is most common in females. On the 31st of December, 1831, there were 162 male epileptics at the Bicêtre, and 389 female epileptics at the Salpêtrière. J. Frank found that of 75 patients 40 were females. The greater proportion of females is to be accounted for by the increased irritability of their nervous system. Of 66 cases in which the period of menstruation was ascertained by MM. Bouchet and Causaveilh, in 38 the seizure happened before, and in 28 after, its occurrence. Epilepsy may occur at all ages; it is, however, most frequent in infancy and childhood, more rare in adults, and seldom met with in old age. The period of puberty seems favourable to its development from the changes which take place in the constitution: and when it existed previously, it often disappears about this period. In 69 cases given by MM. Bouchet and Causaveilh, epilepsy was manifested from birth to the age of 5 years in 18 (9 of these were congenital), from 5 to 10 years in 11, from 10 to 15 years in 11, from 15 to 20 in 10, from 20 to 25 in 5, from 25 to 30 in 4, from 35 to 40 in 2, from 40 to 45 in 1, from 45 to 50 in 2, and from 50 to 60 in 1. Nearly the same results were obtained from the more extended observations of M. Beau, who out of 232 cases found

17 were congenital, 18 determined in infancy at an age unknown; from birth to 6 years it commenced in 22, from 6 to 12 in 43, from 12 to 16 in 49, from 16 to 20 in 17, from 20 to 30 in 29, from 30 to 40 in 12, from 40 to 50 in 15, from 50 to 60 in 4, and from 60 to 61 in 1; in 9 cases the age was not ascertained. Hereditary disposition has been considered as powerfully predisposing to epilepsy. Zacutus Lusitanus, Stahl, Hoffman, Saillant, Maisonneuve, and others, cite numerous examples sufficient to prove this. In 110 cases, where the necessary inquiries were made by MM. Bouchet and Causauveilh, 31 were hereditary. Esquirol considers, from the results of the inquiries he made at the Salpêtrière, that it is more commonly transmitted by the father than the mother, which is contrary to what takes place in madness. Congenital formation in some cases occasions this disease, particularly when the cranium is unnaturally elevated or depressed in particular parts, or otherwise ill-formed. No particular habits of life or temperament are exempt from this disease, although it is more common in some than in others. Foville considers it is more prevalent in the poorer classes, and Copland agrees with him. Ancient as well as more recent observers have noticed the frequency of its occurrence in persons of a plethoric habit of body, and Dr. Cooke remarks, that all the cases he has seen have taken place in those of the sanguine temperament. No doubt can exist, however, that it is often met with in individuals of feeble powers, and that the numerous causes which tend to depress the vital actions powerfully predispose to epilepsy. Thus, it is common in persons of a cachectic habit of body, originating in scorbutic, serofulous, syphilitic, or rachitic affections, or from ill-regulated and improper diet. Esquirol has noticed its frequency in persons of a melancholic temperament. Great excitation or depression of the mental powers, as fear, terror, grief, anxiety, joy, anger, indignation, &c. predispose to this disease. The observations of Hibread tend to show that celibacy may also prove a predisposing cause. On the 31st of December, 1813, he found in the Bicêtre 162 male epileptics, of whom 119 were unmarried, 33 married, 7 widows, and one had been divorced. Particular climates have been thought by some to favour the production of epilepsy; it is certainly more prevalent in some countries than in others, more especially Italy, France, Poland, and some parts of Germany. This circumstance may be more correctly attributed to moral causes, particularly to onanism and premature venereal indulgences. The *plica Polonica* has been thought by Frank and De la Fontaine to be a predisposing cause of epilepsy. Season does not appear to exercise any influence on its production, as in the large receptacles for epileptics in Paris no difference is observed at any particular period of the year. Hippocrates and Tissot, however, considered it more common in spring. The occurrence of one attack produces a state of the system which powerfully predisposes to subsequent seizures.

Among the other predisposing causes may be enumerated peculiarity of constitution or idiosyncrasy; improper nutrition, arising in the infant state from an impaired quality of the milk furnished by the nurse; the presence of the meconium; intestinal worms; errors in diet; irritation of dentition; injuries of the head; ligatures and bandages on the head or neck; insulations; abuse of vinous or alcoholic liquors; organic alterations in the bones of the cranium and vertebral column, or in the membranes or substance of the brain and spinal cord, &c.

The exciting causes are numerous, and may be divided into two classes:—1. Those which act directly on the brain and spinal cord; and, 2. Those which act indirectly.

Of the first class, injuries are common exciting causes of epilepsy, arising from falls or blows on the head, producing fracture of the cranium, or vertebræ, and consequent pressure on the brain or spinal chord, or contusion and concussion. Morbid changes in the nervous substance, or the membranes and bones which cover it, as inflammation, tumours, indurations, softening, &c. of the former, and caries or exostosis of the latter, may also induce the disease. The

numerous circumstances producing congestion, however, are by far the most frequent exciting causes, as the immoderate use of fermented or distilled liquors; excessive exercise; fatiguing exertions; strained positions; suppression of the catamenia, otorrhœa, purulent discharges, and other accustomed evacuations; checked transpiration; metastasis of gout or rheumatism to the head; sudden disappearance of porrigo, psora, herpes, and other eruptions; exposure to a high temperature, especially to the rays of the sun; impure air and crowded assemblies; exposure to cold; atmospheric vicissitudes; disagreeable odours; recollection of particular events; excessive hæmorrhage; bloodletting unnecessarily employed or carried too far; menorrhagia, excessive masturbation or venereal indulgence; inordinate exciting or depressing affections of the mind, as joy, indignation, anger, terror, fear, grief, anxiety, intense mental exertion, disappointment, nostalgia, &c.; watchfulness, frightful dreams, prolonged wakefulness, effect of certain dramatic performances, turning round rapidly, &c.

To the second class may belong difficult or painful dentition; foreign substances in the ear; the presence of the meconium; indurated fæces; mucous, acrid, and foreign substances in the alimentary canal; calculi in the kidneys, ureters, or bladder; narcotic and other poisons; pregnancy and other causes of uterine irritation, &c. It may also occur as a complication of measles, scarlatina, small-pox, and other eruptive disorders in children.

There are some exciting causes that cannot be comprehended under either of the above classes. Thus, numerous instances are given by Baglivi, Boerhaave, Lettsom, Duncan, and others, in which imitation, or witnessing a paroxysm, has brought on an attack. To the same cause, probably, may be ascribed its having occurred epidemically in the free school of Bickfeld in Germany, as recorded by Dr. Meyer. Boys and girls were taught together; only the latter, however, were affected; the girls were approaching the age of puberty, and of a highly excitable temperament. On one morning, two epileptic girls having experienced a paroxysm, in less than half an hour more than twenty others were similarly affected. (*Brit. and For. Med. Rev.*, October, 1838.) Galen, Aretæus, Riverius, Hoffman, Stahl, and many other writers, consider that there is some relation between the paroxysms and the periods of new and full moon. Esquirol, however, states, that in the number of epileptics he has seen together, he has never observed the accessions more frequent at one phase of the moon than at another. Lamotte speaks of a woman who had been pregnant eight times, with five girls and three boys, and had epileptic attacks only when pregnant with boys. In conclusion it may be remarked, that, of all the exciting causes that have been enumerated, fear and terror appear to be the most frequent; next, fits of passion, distress of mind, and venereal excesses.

Varieties. The division of epilepsy generally adopted into idiopathic and sympathetic appears the most useful for practical purposes. The former implies that the disease arises primarily in the brain or spinal cord; the latter, that the exciting cause originates in remote organs. In this sense these terms are synonymous with those of centric and eccentric employed by Dr. Marshall Hall. Another point of great importance to be attended to is, that either idiopathic or sympathetic epilepsy may be connected with an increased or diminished action of the vital powers, and that consequently a very different line of treatment is to be pursued in cases belonging to the former or to the latter.

Idiopathic or primary epilepsy is induced by all those causes we have enumerated which act directly upon the brain or spinal cord.

Idiopathic epilepsy, attended with increased vascular action, occurs generally in persons of a sanguine and plethoric habit, who have lived generously, and whose general appearance indicates a full habit of body. The premonitory symptoms are usually headach, vertigo, noises in the ears, dimness of sight, &c. and full strong pulse. During the paroxysm the face is red, tumid, or livid; the respiration, at first interrupted, becomes difficult and stertorous; the

convulsions in general are not violent or long continued, and the stupor which follows is long and profound. In the interval, vertigo, headach, and the occasional occurrence of the other premonitory symptoms, are common. This variety of the disease has a tendency to terminate in, or to be complicated with, apoplexy.

Idiopathic epilepsy connected with diminished vital action, on the other hand, appears for the most part in individuals of weak constitution, who are supported on insufficient diet, or in persons in whom the bodily functions are exhausted by continued labour under depressing circumstances, or who have been addicted to masturbation and venereal indulgencies. The premonitory symptoms are unusual depression; increased irritability; nausea or vomiting, or fainting, accompanied with a weak, small, and accelerated pulse. During the paroxysm the countenance is not so full and livid as in the variety just described, the respiration is less difficult, the convulsions more violent and longer continued, and the subsequent stupor comparatively slight. During the interval the face is pale and sallow, the pulse small and weak, and there is evidence of general depression. This variety has a tendency to terminate in insanity or mental imbecility.

It must be remembered that cases occur, which are with difficulty ascribed to one or other of the above varieties. In general, however, they are readily distinguished, the most common being that with increased vascular action. Some authors endeavour to draw a distinction between cerebral and spinal epilepsy; but a consideration of the general pathology of nervous diseases must show that this can have no proper foundation, as the malady necessarily consists in the derangement of the functions of both. The convulsions must be attributed to irritation of the spinal cord, and the loss of consciousness to pressure on the brain. The only difference between them, therefore, will be found to consist in the increased degree of stupor when the brain is the organ principally affected, and the more severe convulsions when the exciting cause more especially influences the spinal cord.

Sympathetic or secondary epilepsy is brought on by all those causes we have enumerated which act indirectly on the brain and spinal cord. This species of the disease, while it is also connected with an increased or diminished energy of the vital powers, characterised by the symptoms above described, is principally dependent on diseased action or disordered function in other organs. Hence affections of the circulating, digestive, biliary, urinary, and generative organs may occasion attacks of epilepsy, and give rise to so many varieties of the disorder. Sympathetic epilepsy connected with disease of the heart has been noticed by Morgagni, Lancisi, Gould, Greding, Reid, and other writers, who have pointed out, that in these cases the attacks are preceded or accompanied by irregularity or intermission in the heart's action. Syncope is also a frequent symptom, and in cases thus complicated, the epileptic paroxysm is often brought on by mental emotions. This variety is generally associated with a depressed state of the system. Sympathetic epilepsy arising from irritation in the digestive organs has received the name of *epilepsia stomachica, gastrica, enterica, verminosa*. When the stomach is affected, one or more of the following symptoms may be observed: cardialgia; nausea; eructations; vomiting; increased, capricious, or diminished appetite; loaded tongue; disagreeable breath; acid or bitter taste in the mouth; torpid bowels, and various dyspeptic symptoms. They are for the most part associated with a state of vascular excitement. When the intestines are the seat of irritation, many of the above symptoms may be present, sometimes accompanied with pain in the abdomen, attended either with constipation, or with diarrhœa, arising from accumulation of acrid secretions or indurated fœces, and portions of undigested food. In children the disease is often brought on by the irritation of dentition during the first or second period; in the latter case the disease is occasionally severe and of long duration. The presence of worms, especially the tape and lumbricoid varieties, in the intestines, is also a frequent cause of

convulsions in children. In these cases, the usual symptoms of the presence of worms are observed: viz. craving, voracious, and unnatural appetite; costiveness, alternating with diarrhoea; the appearance of the stools being unhealthy; tumid abdomen; picking the nose; great restlessness, &c. When epilepsy is connected with irritation in the biliary organs, it may be suspected from the sallow or jaundiced appearance of the face or skin. If there be pain, fullness or tenderness in the region of the liver, with flatulence, occasional hiccough, vomiting of yellow or greenish bile, light or clay appearance of the stools, &c. we may in general ascribe the origin of the disease to a morbid condition of the liver. During the paroxysm the respiration is often interrupted, and the diaphragm moves with difficulty, and is apparently drawn downwards. Obstruction in the biliary ducts from gall-stones, or other causes, may also induce this variety. Sympathetic epilepsy may arise from irritation in the urinary and generative organs. Thus, calculi in the kidneys, ureters, bladder, or stricture of the urethra, may prove exciting causes. We have already alluded to the influence of masturbation in the male and female, or of disordered uterine functions in the latter, as exciting causes of the disease. This last forms the *epilepsia uterina*, *hysteria*, *nervosa*, &c. of authors, and has been ably treated by Dr. Prichard, who has recorded several cases of this variety of the disease. It generally appears about the menstrual period, and is most common towards the approach of, or soon after, puberty. It may also arise from difficult, obstructed, suppressed, or excessive menstruation, or indeed from any cause producing irritation of the uterus or genital organs in general. Convulsions are also frequently met with in connection with pregnancy and parturition. Lastly, epilepsy may be connected with irritation in the skin and external organs of the body. Numerous cases have been reported by authors, in which epilepsy has apparently been induced by the appearance or disappearance of cutaneous eruptions, ulcers, cicatrices, tumours, wounds, &c. and which have been cured by their removal.

It must be evident, that attention to these sympathetic varieties is of the utmost importance with a view to the proper treatment of the disease, as by removing the irritation which is the exciting cause, the disorder is in many cases relieved or disappears with it.

Anatomical characters. All the various morbid alterations to which the brain and spinal cord are liable, have been found in persons who have fallen victims to epilepsy. When an individual dies, who has for a short time been labouring under this disease, uncomplicated with any other nervous affection, no appreciable lesion can be discovered. If death takes place during a paroxysm, more or less congestion of the brain is often found. If the disease be of longer standing, and is connected with mental aberration, there is generally considerable dilatation of the bloodvessels, accompanying an indurated or softened state of the white matter of the brain, affecting either its whole substance or particular parts of it. There are also irregularities in the surface of the grey matter, arising from chronic inflammation, with adhesions to the membranes which cover it, as has been shown by Morgagni, Foville, Bouchet, and Casauveilh. It often presents a marbled appearance and a rosy tint, dipping more or less into its substance, and is sometimes increased or diminished in consistence.

Such are the appearances most generally found; but in particular cases, other alterations have been described by authors, and thought to have some relation to the disease. It has been remarked, for example, by Leduc and Lorry, that the bones of the cranium are generally thickened in epileptics, and the sutures more or less effaced. Dr. Bright gives the delineation of a case, in which the anterior portions of the cranium were thickened nearly half an inch, and Bontius found on one occasion the occipital bone nine lines thick. Zacchias saw the interior table of the same bone destroyed by caries. Exostosis and caries have been frequently found in the bones at the base of the

cranium, and prolongation or alteration in direction of the processes in the same situation, by the Wenzels, Greding, Neumann, Sims, and others. Dr. S. Palmer has furnished us with several cases observed and examined by him in the Edinburgh Poor-house, where the sphenoid bone was more or less thickened, the posterior clynoïd processes elongated, or various spicula of bone growing from the base of the cranium. The membranes, also, are often thickened, and contain osseous points, spicula, or tumours of different forms. Esquirol, on opening an epileptic, aged twenty-three, found an osseous ovoid tumour adhering to the internal surface of the dura mater, eight lines in diameter, depressing the superior convolutions of the brain. We have seen in the possession of M. Magendie, the preparation of a brain taken from an epileptic, whose intelligence was perfect during the intervals, although two tumours growing from the dura mater had considerably pressed upon both anterior cerebral lobes. One, on the left side, was the size of a walnut, and had hollowed out for itself a portion of the nervous mass; while the other, on the right side, was much larger, and intimately connected with the substance of the brain, so that its exact extent could not be ascertained. The sinuses and vessels of the brain are often turgid with blood, their coats containing fibrous and osseous secretions. Small bony points in its substance are so common, as to be considered a natural rather than a morbid occurrence. Greding has found it softened in twenty-five epileptics. The penial gland has been found more or less changed by Baillie, Soemmering, the Wenzels, and Greding. The pituitary gland has been found more or less altered by the Wenzels, Greding, Neumann, Sims, and others. The Wenzels in particular have directed much attention to the changes in this substance, which they have always found altered in epileptic cases. In twenty epileptics they discovered it enlarged in seven; containing a yellow solid or pulverulent matter in ten; and a thick viscous fluid in five. It often showed traces of inflammation, although there was no other alteration in the brain or meninges. In the substance of the brain have been found scirrhus, tuberculous, fibrous, osseous, or encysted tumours; extravasations of blood; abscesses, &c. Morgagni, Greding, Mickel, Boerhåave, and others, have found the brain indurated and even callous, and in many cases softened. Serum has been effused into the lateral ventricles, and the plexus choroides has been found enlarged, injected, and containing serous cysts.

Most of the morbid changes we have mentioned as connected with the brain have also been discovered in the spinal cord. M. Esquirol, assisted by M. Amussat, found that, in ten epileptics who died at the Salpêtrière between the 1st of February and the 1st of June, there were nine with lesion of the cord or its coverings, the most common appearance being concretions in the arachnoid membrane. M. Gendrin has discovered tubercles in the superior part of the cord in several epileptics, and in one case M. Andral found the cervical portion indurated.

In the sympathetic varieties of the disease, numerous lesions of the viscera and other structures of the body have also been discovered. In the cardiac variety, a greater or less number of the alterations to which the heart is liable, are found, such as water in the pericardium; hypertrophy or atrophy of the substance of the organ; dilatation of the cavities; obstruction in the aorta or pulmonary orifices. Various diseases of the lungs may occur in individual epileptics. The numerous morbid changes which take place in the stomach or digestive tube; intestinal worms; enlargement, inflammation, abscesses, and other lesions of the liver; diseases of the kidneys or bladder, or calculi in these organs; ulceration or other morbid alterations in the uterus and genital organs of the male and female; tumours and inflammation in the course of the nerves; wounds, cicatrices, ulcerations, eruptions, &c. on the surface; and indeed almost every morbid alteration which the various tissues undergo, have been found in epileptic cases.

Nature. Epilepsy is characterised by two distinct morbid phenomena,

namely, loss of consciousness and convulsions. Whatever be the nature of the connection between intelligence and nervous matter, all physiologists are agreed, that the cerebral lobes furnish the conditions necessary for its manifestation. Numerous facts and experiments also demonstrate that motion depends upon the *tractus motorius* of the spinal cord, and that combined movements may be attributed to its being acted on by the stimulus of volition on the one hand, and that of mechanical irritation on the other. In epilepsy there is a loss of the first function and increase of the second, and consequently we regard this as a cerebro-spinal disease, the functions both of the cerebrum and spinal marrow being necessarily deranged. Foville asks how it happens in epilepsy, when consciousness and sensation are abolished, that motion should be so much increased. The fact is, this is the circumstance which constitutes epilepsy. If the functions of the brain alone were increased or diminished, there would be delirium or apoplexy; if those of the spinal cord, convulsions or paralysis. In the disease we are considering, however, the functions of the brain are lost, while those of the spinal cord are increased; and although in this, as in all nervous diseases, numerous modifications occur, by which, in different cases, it more or less approximates to other disorders of the same class, these circumstances may be considered the distinguishing characteristics of this affection.

What is the lesion which occasions these effects? A consideration of the different alterations usually discovered after death, renders it evident that they cannot be attributed to them, although it is reasonable to suppose, that when spicula of bone or other morbid structures directly irritate the motor columns, or some part of the brain, they may predispose to convulsions. But that this is not the sole cause, is evident from the occasional occurrence only of the attack, while such morbid structures are constant. If a spicula of bone occasioned the convulsions, they would continue so long as it was present; and supposing that this or other limited fixed lesion could produce either the loss of consciousness or increased motion, we cannot suppose it capable of annihilating one function and exciting another at the same time. These different organic alterations, therefore, can only act by rendering the brain more liable to sudden changes of the circulation within the nervous structure; and considering that epilepsy is usually found in individuals either of plethoric or debilitated constitution, that the attacks are excited by causes influencing the circulation, and that, when death occurs during a paroxysm, increased turgidity of the cerebral vessels is invariably found, we are at once led to the conclusion, that we must attribute to cerebral congestion a necessary part in the production of the disease.

That there is cerebral congestion during the attack is generally admitted, but it is still disputed whether it be the cause or the effect. It is stated by Foville, that we cannot refer the phenomena to congestion, inasmuch as the paroxysm ceases when the congestion is at its height, as manifested by flushing of the face, turgescence of the exterior parts of the head, tension of the jugulars, &c. But the continuation of such symptoms a short time after the decline of the paroxysm, by no means proves that when this takes place the congestion of the brain is most intense; on the contrary, as it precedes their appearance, so its diminution must occur before their disappearance, for it is only when there is obstruction of the circulation within the cranium, that the blood is diverted into the external vessels; and the effect so produced must be most intense when the cause begins to diminish. Besides, congestion is the only morbid state which can produce the results. Thus, it may be partial or general, and more intense in one portion than another; and in the introductory remarks, and when speaking of apoplexy, we have alluded to the fact, that slight pressure causes increased action, and intense pressure, diminution or loss of action. The substance of the brain itself is incompressible by any force which can reach it from the heart, but the caliber of the numerous tubes which traverse it may be increased or diminished. This, of course, may occur

unequally, giving rise to different degrees of pressure; and hence we can understand how congestion may occasion in one case apoplexy, in another paralysis, in a third convulsions, &c. according to its seat and intensity. Thus, in epilepsy, the cerebral lobes probably undergo such a degree of pressure as would cause temporary loss of intelligence, while the cranial portion of the spinal cord is only affected to such an extent as to occasion convulsions. The tendency of the paroxysm to return is not peculiar to it, but to all congestive diseases; and we can readily comprehend how a certain set of vessels, being once preternaturally dilated, are more disposed than others to become so again. The repetitions of the attack will of course lead to permanent organic lesions, as dilatation of the vessels, induration of the brain, &c. and gradually to continued disorder in the functions of the organ.

The spinal symptoms may be caused either by direct or indirect irritation of the cord acting on the tractus motorius. The former is induced by congestion of the brain, or other morbid changes acting on the cranial or vertebral portion of the cord, and the latter by stimuli affecting the extremities of the nerves. The researches of Hall and Müller have shown that all convulsions are spinal, and that, when occasioned by irritation in distant organs, they depend upon a reflex function in the spinal cord. In epilepsy they must necessarily be independent of sensation, as consciousness and mental acts are abolished. In the sympathetic varieties of the disease, there can be little doubt that the convulsions are so caused originally, because many cases have been cured by the removal of the source of such irritation. It is not, however, simply convulsions that constitute epilepsy, but a loss of consciousness combined with them; and the influence of cerebral congestion is at once determined by contrasting their violence and extent after the fall, with the spasms or irregular movements which precede it. Hence, whatever the exciting cause may be, whether the motor column be irritated directly or indirectly, and the stimulus producing this be situated in the brain, spinal cord, or nerves, it is to cerebral congestion alone, acting on the two former, that the phenomena which constitute the epileptic paroxysm can be referred.

Diagnosis. Epilepsy in its severe form is readily distinguished from every other disease. It may, however, be so modified as somewhat to resemble, during the attack, other nervous affections. Hysteria has often been mistaken for epilepsy, from which it may be discriminated by the presence of the globus hystericus and boborygmi, while the sensibility and consciousness are little, if at all, affected. The characters of the convulsions are somewhat different, being more uniform and clonic; the features are less injected, and not so distorted; and the attack is not followed by sopor or fatigue. In the interval the history of the case, and the presence of other hysterical symptoms, in general indicate the nature of the convulsive attacks. Occasionally, however, epilepsy is complicated with hysteria in females, and the paroxysms peculiar to each may alternate, or partake of the characters of both. The loss of consciousness distinguishes the epileptic fits from the others in some cases, although very often no difference whatever can be discovered between them. Dr. M. Hall has pointed out, that in epilepsy the larynx is usually closed, with forcible expiratory efforts, while in hysteria it is open, with heaving, sighing, breathing. It is often very difficult to distinguish the convulsions in children from epilepsy, especially at an early age; hence observation of the case for some time is always necessary before the diagnosis is pronounced. In general however, when not epileptic, the paroxysms are irregular, more frequent, and continued; and the convulsions are of a clonic character. There is also more or less fever, dislike of food, thirst, watchfulness, or drowsiness. The convulsions are most common at the periods of dentition, and cease when the irritation this process occasioned is removed. Epilepsy is distinguished from apoplexy by the character of the convulsions, the limited continuance of the attack, and the history of the case during the interval. From all other diseases it is recognised by the occurrence of a scream; the preceding loss of consciousness, accompanied by tonic con-

vulsions, which are immediately followed by sopor and a sense of fatigue, and, as the malady becomes chronic, by mental aberration. Real may be detected from feigned epilepsy during the paroxysm by the sudden application of any substance causing great irritation. If sensibility is manifested, we may consider the individual an impostor.

The diagnostic symptoms characterising the different varieties of epilepsy are easily distinguished by referring to the description given of them.

Prognosis. The opinion of the practitioner may be required regarding the probable danger of the fit, the period of its return, or the curability of the disease.

Epilepsy seldom proves fatal during the attack. This result, however, is most to be apprehended in individuals of a plethoric and sanguine constitution, in whom extravasation of blood within the cranium may take place. The long continuance of coma is to be looked upon in an unfavourable light. When, also, symptoms of organic disease in the brain exist, as deep-seated, fixed, and intense pain; partial or total loss of vision, or of the other special senses; vigilance; paralysis, &c. the attack will probably be attended with fatal consequences. In young persons the paroxysm seldom indicates any immediate danger, unless from accidental circumstances, as injuries of the head, &c. or from situations where the patient may be at the time of seizure, as on the banks of a river, high-road, an open window, near a fire, &c.

The paroxysms recur more frequently in the idiopathic than in the sympathetic form. If the disease be hereditary, and there be marked alteration in the form of the cranium, or if organic lesion have taken place in the brain or spinal marrow, frequent recurrence of the fits may be expected. Of the sympathetic varieties, the paroxysms are most common when the heart is affected, while the intervals are more considerable when the disease arises from irritation in the digestive, urinary, or uterine organs.

An opinion regarding the curability of the disease should always be very guarded, the most experienced physicians having acknowledged that it is one of the most obstinate maladies they are called upon to treat; indeed, by some it is considered to be incurable. The idiopathic form of the disease is always to be considered less curable than the sympathetic; and when there is evidence of organic alterations in the brain or spinal cord, and when paralysis or insanity continues during the intervals, very little hope can be entertained of restoring the patient to health. The same may be said if the disease be decidedly hereditary, or if there be any marked change in the form of the cranium. The affection is more curable before the age of puberty, and often disappears during the changes produced in the system at that period; but should they continue, it is a proof that the disease is more firmly fixed in the system. When the general health is much impaired by masturbation or venereal indulgences, or is associated with a scorbutic, syphilitic, scrofulous, or rachitic diathesis, the disease is generally obstinate, although it occasionally disappears on abandoning the improper practices which occasion it, or by removing the malady with which it is complicated, and improving the general tone of the system.

Treatment. The treatment of epilepsy should have reference, 1. to the seizure, with a view of lessening its violence or guarding against injury; and 2. to the disease, with a view of diminishing the frequency of the paroxysms, or preventing their return.

1. *Treatment of the seizure.* Immediately on the occurrence of an epileptic fit, all ligatures should be removed, and the head and shoulders supported in an elevated position. When preceded by the aura epileptica, a tight band should be placed just above the part where the sensation is experienced; in some cases this has been known to prevent the attack. If it take place in a house, the patient should be laid on a bed, and air freely admitted into the apartment. A cork, or a piece of soft wood in the form of a wedge, should be introduced between the teeth as soon as possible, in order that the tongue may not be lacerated, and the violence of the struggles gently restrained, so as to prevent any

injury to the individual. As a general rule, no further interference is necessary or even useful, more particularly if the practitioner is unacquainted with the constitution and previous history of the patient. Stimulating the nostrils, or attempts to make the individual swallow, are injurious. But if it be a first attack, and if there have not been previous symptoms of diminished vital action, or if he be decidedly of a plethoric constitution and sanguineous temperament, bloodletting may be resorted to with advantage. This remedy is also useful when the attack supervenes during the puerperal state. Cold affusion on the head is beneficial under the same circumstances, and should be continued for some time, so as to produce a depressing effect. It must not be persevered in, however, when the heat of the scalp and force of the pulse is diminished. The above remedies may be employed, also, during the sopor which continues after the convulsions have ceased, if there be much heat of the head, a strong pulse, turgid countenance, and other signs of congestion in the brain connected with increased vascular action. But it must be remembered that they are dangerous when the disease is connected with an opposite state of the system. Dr. Copland relates two cases where indiscriminate bloodletting increased the frequency and severity of the attacks. Stimulating purgative injections, particularly such as contain turpentine and camphor, may be used in most varieties of the disease with benefit.

Many efforts have been made to shorten the attack. Dr. F. Hawkins thinks filling the patient's mouth with common salt useful for this purpose. Dr. Reid says, that "pressing the cold hand of an assistant forcibly on the soft part of the abdomen towards the spine, while the patient is firmly supported on the back, with the head and shoulders raised," diminishes the duration of the seizure. Frank thinks the same effect is occasioned by placing a piece of cold metal in the hands; and Dr. Copland has seen apparent benefit from a similar application to the nape of the neck, or occiput. The plan of Dr. Hawkins may induce suffocation, and is therefore dangerous, but the others recommended may be tried when the fit appears unusually long, although in most cases they will be found to produce no influence on the convulsions.

2. *Treatment of the disease.* From what has been said when describing the different varieties of epilepsy, it will be evident that, as the disease may be connected with a plethoric or asthenic state of the system, or as it may arise from primary disease of the brain, or from various sympathetic irritations, the treatment must depend on the nature of, and circumstances connected with, each individual case. A successful result of curative measures, therefore, will materially depend upon our being able to refer the particular case to its appropriate species and variety. With this view, the practitioner should make minute inquiries into the history of the case, especially as to the cause of the original and subsequent attacks; the existence of premonitory symptoms; frequency of the paroxysms, and the effects which have appeared to follow. He should pay great attention to the constitution, mode of life, and habits of the individual, to the state of the circulation, and whether any recent or chronic malady, or other source of irritation, exist in any part of the system.

The imagination has a powerful influence both in relieving and augmenting many of the forms of epilepsy, especially in females, and to this may be attributed many of the astonishing cures boasted of by charlatans. A knowledge of this fact should induce the practitioner to gain the confidence of the patient, by inspiring in him a moderate degree of hope, indulging to a certain extent the weakness to which he may be subject, adopting a decided and calm manner, and guarding against a too great appearance of mystery on the one hand, and unnecessary communicativeness on the other. In many cases the moral treatment is as important as the physical, and great tact is often necessary to prevent the gloom, melancholy, or despair, with which many epileptics are affected. Bodily and mental exercise skilfully varied, so that neither fatigue nor ennui shall be occasioned, is of great service as a means of abstracting the mind from the disease. Sudden changes in remedies have often

been known to prevent an attack for a long time, and if managed judiciously, a succession of different medicines at proper intervals may in some cases, by rendering the attacks less frequent, tend much to obviate their recurrence. Care, however, must be taken to guard against disappointment, by not raising the expectations too high.

In the treatment of *idiopathic* epilepsy connected with increased vascular action—a variety of the disease more common than any other in Britain—depleting remedies are indicated to a greater or less extent according to circumstances. If the heat of the head be great, the countenance flushed, the pulse slow and strong, bloodletting is necessary, followed by cold affusion on the head. The extent to which the bleeding should be carried must be regulated by the effect it produces on the pulse. If the vascular excitement be moderate, the topical abstraction of blood from the occiput, nape of the neck, or in the course of the spine, by cupping or leeches, may be substituted. Active purgatives, by the mouth or in the form of injection, will assist in lessening the general excitement, and with this view the more powerful cathartics should be employed, as croton oil, elaterium, gamboge, scammony, jalap, &c. until several copious stools are procured. Having by these means somewhat reduced the general excitement, our endeavours should be directed to preventing its return. With this view, occasional topical bleedings by cupping or leeches, repeated according to circumstances, should be employed; and if the attacks are at all of a periodic nature, the abstraction should be made a short time before they are expected to appear. The shower bath, or the affusion of cold water on the head daily, is of great service; blisters, setons, issues, and moxas, behind the ears or to the occiput, should also be used so as to keep up a constant discharge, or the antimonial ointment rubbed over the nape of the neck, occiput, or spine, so as to bring out and keep up a copious eruption of pustules.

Antimonial preparations have a powerful effect in reducing vascular action, and when this variety is well-marked, the patient should undergo a course of James's powder, after the manner recommended by Dr. Cheyne. According to this experienced physician, the patient should begin with a very moderate dose, not more than two or three grains at bedtime, which ought to be increased by half a grain every night, until some sensible effect upon the stomach, bowels, or skin, is produced. Should the stomach be affected with sickness, the dose must be lessened by one grain on the following night. By the addition of a few grains of rhubarb, a larger quantity of James's powder may be administered than the stomach could otherwise bear. If the skin be softened, or the bowels affected, the dose should not be further increased, but it must be repeated every night for a considerable time. In several instances, eighteen or twenty grains have been taken for a considerable period without inconvenience. (*Dub. Hosp. Rep.*, vol. i. p. 315.) Attention must be paid to the regularity of the alvine excretions, and occasional purgatives or injections administered in order to insure this result, and with a view of assisting the other depletory measures. It is of great importance that the diet should be low, and that the patient should abstain from animal food, and fermented or spirituous liquors. All mental agitation and violent exercise should be avoided, the bedroom kept at a moderate temperature; the patient should sleep on a firm mattress, with the head and shoulders well-elevated, and sleep should not be prolonged more than seven hours.

The general treatment of idiopathic epilepsy connected with diminished vascular action, is directly the reverse of that just described, the object being to remove inanition, and by gentle stimulants and tonics to increase the tone of the system. A knowledge of the causes which have induced the epileptic seizure is here necessary, as it will be in vain to attempt to obviate the disease so long as its source is unsuspected or unknown. Thus a knowledge of the individual being subject to exhausting discharges; living upon a scanty diet, or not sufficiently nutritive; working in manufactories under depressed circumstances, in an unhealthy situation, or at too early an age; indulging in

the vicious practice of onanism or excessive venereal pleasures, &c. is of importance. It should not be forgotten, also, that the system may be so reduced by bloodletting and antiphlogistics, as to render an invigorating line of treatment necessary. If the pulse be quick and feeble, if there be great irritability, and the patient appear much exhausted, gentle stimulants should be administered occasionally, such, for example, as the aromatic spirits of ammonia; Tr. Card. Co., Tr. Cinch. Co., &c. conjoined or alternated with tonics, as the sulphates of iron, copper, zinc, or quinine, or any of the bitter infusions. The diet should be nutritive and of easy digestion, and a moderate meal, taken three or four times a day. Evacuations from the alimentary canal should be obtained regularly by stomachic laxatives; such as rhubarb, cream of tartar, the neutral salts, or castor oil, combined with aromatics and compound purgative tinctures. Violent purgatives should be avoided. If there are occasional sensations of lightness or emptiness in the head, sponging the forehead and scalp with cold water, or, if the patient be not too weak, a daily use of the shower bath is useful. The application of cold in these cases should not be continued, but applied suddenly, and for a short time, so as to produce a stimulating reaction. Friction of the surface of the body with coarse towels, or the flesh brush, is beneficial after the shower bath, or shampooing, if the patient be not too much exhausted.

Dr. Cheyne strongly recommends walking and exercise in the open air, as a powerful means of promoting digestion and improving the muscular strength. Care, however, must be taken that fatigue is not produced. When the spine appears to be debilitated, the same general treatment is necessary; but the cold affusions, blisters, and other local remedies, should be applied over the diseased part. If there is reason to suspect that the disease has been induced by masturbation in either sex, the impropriety and danger of the practice ought to be forcibly pointed out to the individual, who should be watched, and not allowed to sleep alone. Cold affusion, night and morning, on the genitals and in the course of the spine, or sea bathing, together with tonics, exercise, and a nutritive but not stimulating diet, should be employed. The patient should rise early, sleep on a firm mattress, avoid crowded assemblies and heated rooms, and have the mind constantly engaged in some pursuit. Should the disease proceed from sexual indulgence, or from addiction to intoxicating liquors, both should be imperatively forbidden. In these cases, in addition to the general means already pointed out for remedying debility, the *Liquor Potassæ*, or alkaline carbonates, should be given in combination with bitter infusions. The muriate of morphia, or extract of henbane or of lettuce, combined with camphor, will lessen the general irritability. When epilepsy is connected with scrofula, alteratives should be conjoined with the tonics, such as small doses of the chloride or the bichloride of mercury, the blue pill, hydriodate of potass, soduret of iron, &c. or the mercurial and iodine preparations may be given on alternate nights. If the malady be complicated with syphilis, scurvy, or other cachectic affections, the appropriate treatment for these disorders must be employed. Esquirol cites two cases in which epilepsy disappeared when the syphilis with which it was associated was cured by mercury.

Although idiopathic epilepsy generally belongs to one or other of the two forms described, cases are sometimes met with which cannot be attributed to either, inasmuch as the state of the vascular system and general strength does not appear to be above or below the natural standard; while, at the same time, no symptoms are present which can be referred to functional derangement of any particular organ. In these cases stimulating purgatives may be given, with cold affusion on the head, or the shower bath and occasional topical bleedings, when symptoms occur to acquire this practice, from the occiput or nape of the neck. Exercise in the open air, by walking or in a carriage, travelling, frequent change of air, light farinaceous diet, avoiding fermented and spirituous liquors, are beneficial. Some cases may require a more nutritive diet, with the exhibition of the mineral and vegetable tonics, occasional dry cupping, and the application of blisters or tartar emetic ointment to the

occiput and spine. Great care should be taken not to excite the passions, and to overcome the mental depression which is often great in these cases. The moral treatment formerly alluded to must not be overlooked.

The indications in the treatment of *sympathetic* epilepsy are, first to remove the disorder which is the primary cause of the epileptic disease, and then to combat the tendency to its return, which the system may have acquired. In epilepsy connected with disease or disorder of the heart, a cure is seldom accomplished. It is often difficult to determine whether the cardiac affection is the cause or effect of epilepsy. Organic disease of the heart, especially hypertrophy of the left ventricle, is frequently complicated with cerebral disease: on the other hand, frequent epileptic attacks, by their effect on the centre of the circulation, may gradually occasion disease of the heart. In either case it will be necessary to diminish the heart's action by appropriate remedies, while at the same time attention is paid to the general or constitutional powers, or to any local disease with which the cardiac or cerebral affection may be complicated. If there be plethora, and the quantity of blood in the body seems above the natural standard, local depletions by leeches or cupping, followed by derivatives, as setons, issues, tartar emetic ointment, or a succession of blisters over the precordial region, ought to be employed. These remedies should be combined with active purgatives, a low diet, antimonials, and the treatment pointed out for diminishing excessive vascular action. But when, as is generally the case, the cardiac epilepsy is associated with a depressed state of the system, the exhibition of tonics and a nutritive diet, with counter-irritation over the region of the heart, should be adopted. When pallor and a feeling of syncope precede the attack, or palpitation of the heart is experienced, an antispasmodic draught should be administered. All agitation of the mind should be carefully avoided, and any pulmonary inflammation or congestion that may appear combated by local bleeding, derivatives, and general antiphlogistic measures, which, however, should have strict reference to the constitution or powers of the individual.

Epilepsy connected with irritation in the digestive organs is the most common variety of the sympathetic form of the disease. When there is nausea, eructations, vomiting, and other symptoms indicating that the stomach is disordered, the exhibition of an emetic is often advantageous. Digestion being generally imperfectly performed, laxatives combined with tonics are necessary; such as the compound colocynth, galbanum or rhubarb pill combined or alternated with quinine, nux vomica, the preparations of bark or bitters. The mineral tonics, as the sulphates of zinc, iron, or copper, nitrate of silver, Mist. Ferri Comp., are often useful. When there is a bitter taste in the mouth, and the biliary secretion appears more or less disordered, mercurial preparation should be combined with the above remedies. If there be an acid taste, the alkaline carbonates, in conjunction with the infusions of gentian, quassia, orange-peel, &c. often remove this unpleasant symptom. Pains in the abdomen, depending on costiveness or on an accumulation in the alimentary canal, may be removed by laxative injections, combined with, or followed by, opiates, stimulants, or antispasmodics, as the case may require.

When epilepsy is connected with dentition, the gums should be freely divided every third or fourth day, and the fever subdued by gentle saline laxatives, antimonials, and low diet. If it depend on the presence of worms, they are to be expelled from the intestines by purgative anthelmintics, administered both by the mouth and by enemata. If the appetite be voracious, it must be combated by improving the tone of the stomach by the mineral and vegetable tonics, combined with occasional laxatives.

The careful regulation of the diet is of the utmost importance in this variety of the disease; generally speaking, it should be nutritious, but of light and easy digestion. The meals should be taken three or four times a day, not much eaten at a time, and that well masticated. All fermented and spirituous liquors should be avoided. Exercise short of fatigue in the open air, travelling

and change of scene, also assist in removing the morbid condition on which the epilepsy depends. A short time spent at one of the fashionable watering-places, drinking the chalybeate or purgative waters, is often beneficial. The remedies above recommended must always be prescribed with reference to the state of plethora or anæmia that may exist. In the former, active purgatives may be ventured on, while stimulants should be avoided, and a modified antiphlogistic plan of treatment pursued; whereas, in the latter state, which is more commonly associated with this variety, occasional gentle laxatives, with tonics, antispasmodics, slight stimulants, and a nutritious diet employed.

To epilepsy connected with irritation in the biliary organs, a similar plan of treatment is applicable. When, however, there appears to be a deficiency of the biliary secretion, the blue pill, or calomel combined with laxatives, should be given occasionally to stimulate the liver to a proper performance of its function. If there be symptoms of acute or chronic inflammation of the liver, general or local bloodletting, blisters, and other derivatives, should be employed, according to the severity and nature of the symptoms. Should the liver be enlarged, or there be obstruction in the biliary ducts from indurated bile or gall-stones, deobstruent purgatives, preparations of mercury and of iodine, combined with depleting, stimulating, or tonic remedies, should be employed according to the symptoms and the constitutional powers.

The curative treatment of epilepsy connected with irritation or disorder in the urinary or generative organs, must have reference to the nature of the local disease; disorders of the urinary organs are a much less common cause of epilepsy than that arising from irritation of the genital organs, and when they exist, must be removed if possible by medical or surgical means. In females, affections of the uterus are intimately connected with the production and communication of epilepsy; hence the manner in which the functions of that organ are performed should always be particularly inquired into. The treatment of this form should have strict reference to the state of the constitutional powers. Thus, if the habit is full and strong, and the catamenia suppressed or diminished, general bloodletting may be employed, or leeches applied to the inside of the thighs, or to the neighbourhood of the vulva; while the hip bath, emmenagogues, and other remedies usually employed to favour the flow of the menstrual fluid, are exhibited. Dr. Prichard recommends the warm bath, conjoined with bleeding, in these cases, the effects of which are to be promoted and maintained by fomentations to the feet and to the lower part of the abdomen, by means of moderate warmth and by frequent draughts of warm diluent drinks. Anodynes and hypnotics will tend to remove pain and sleeplessness if present. If there be much irritation or evidence of hysteria, the latter remedies also should be employed in conjunction with cooling saline purgatives and antispasmodics. If the patient be chlorotic, or the catamenia be irregular or profuse, a stimulating and tonic plan of treatment is necessary. As has been remarked by Stahl, Hoffman, and others, marriage has sometimes removed the complaint. If the fits generally appear before the menstrual period, the application of leeches to the vulva, or the warm bath, with the judicious administration of purgatives, especially the castor oil and turpentine enema, may occasionally avert or render them less frequent. But if they follow the flow of the menses, tonics and the application of cold to the genitals, and such remedies as diminish the amount of the discharge, may produce the same effect. Should epileptic fits occur about the period of the catamenia, without any diminution or increase in the amount of the discharge, a small bleeding will probably be beneficial. In such cases Dr. Prichard has remarked, the flow of the menses appears to be deficient with respect to the particular habit of the patient, although not remarkably scanty in proportion to what is observed in other individuals. When the attacks appear in girls before the age of puberty, antiphlogistic measures or strengthening remedies must be employed according to the constitution of the patient, and emmenagogues, and such remedies as favour the appearance of the catamenia, administered. In both sexes,

wherever masturbation is detected or suspected, the means formerly described should be employed.

When epilepsy is connected with irritation in the skin or external organs of the body, it must be treated constitutionally in the same manner as the other varieties. The local disorder must, if possible, be removed, or the irritation it produces diminished. The cutaneous diseases with which the epilepsy is complicated, must be treated in a manner appropriate to the particular affection.

Although it sometimes happens that epilepsy is cured by removing the local disease which has occasioned it, the practitioner must not be too sanguine as to a permanent recovery, as it unfortunately often happens, that the system acquires a predisposition to the affection which may thus continue in an idiopathic form after all local irritation has been removed. This has been remarked with regard to the disease when connected with uterine affections by Maisonneuve, and the remark is applicable to all the other varieties. More or less disorder in different organs also may supervene on epilepsy which was originally idiopathic, and care must be taken, while directing our remedies with a view of curing the former, not to neglect the constitutional and moral treatment. In the advanced stages of the disease, when paralysis or mental alienation has supervened, although we must abandon all hopes of cure, we should endeavour, to ameliorate the severity of the attacks, and lessen their frequency. With this view the constitutional and moral treatment already described should be followed, and every thing that skill and humanity can suggest for alleviating the condition of the individuals, employed. If apoplexy supervene, the treatment recommended for that disease should be adopted.

In the treatment of a disease which too generally bids defiance to the best directed efforts, it is not surprising that various remedies should have been had recourse to, even on empirical or unascertained principles. We shall mention a few medicines which have been thus occasionally administered. Phosphorus has been given, but is generally considered a dangerous medicine. Strychnine has been found useful in some chronic cases, complicated with paralysis. Electricity and galvanism have been occasionally successful, but they should only be employed when there is marked evidence of depression, and even under such circumstances they have by no means proved of such benefit as to lead to great confidence in their efficacy.

Tonics have been extensively administered, and, as has been shown, are directly indicated whenever the disease arises from, or is associated with, a depressed state of the vital powers. They have been principally depended on after the use of bloodletting and other active measures, and in many instances have been advantageously combined with local depletion. Of the mineral remedies of this class, the nitrate of silver has of late years attracted much attention, and its occasional success has been attested by Drs. Wilson, Sims, Baillie, Roget, J. Johnson, Lombard, and others. It is usually given in substance in the form of pill made with bread crumb. A pill containing half a grain is to be given every night and morning, and the dose is to be gradually increased to five or six grains in the course of the day. In general, a long-continued trial of the medicine is necessary. There is, however, a great disadvantage in the employment of nitrate of silver, in the circumstance of its producing in some individuals a dark, permanent discoloration of the skin, as observed by Drs. Roget, J. Johnson, and Vetch. This forms a powerful objection to its use. When employed, therefore, it should not be too long continued at one time. An eruption of small pustules on the surface of the body has been observed to follow its employment by Simentini and Copland, which the latter thinks should be looked upon as a favourable circumstance.

Several other mineral tonics, as the preparations of *iron, copper, zinc, arsenic, bismuth*, &c. have been employed with varied success by various writers, especially the sulphate of zinc. They may be used either alone or combined with other remedies. The vegetable tonics, especially quinine, the different

preparations of cinchona, gentian, and the other bitter roots, barks, and herbs, have likewise been occasionally prescribed.

Cold and salt water bathing are beneficial as tonics, but they should be avoided when dreaded or disliked by the patient, as this alone has often been known to bring on an attack.

Narcotics and anodynes, especially belladonna, opium, hyoscyamus, and stramonium, are beneficial when epilepsy occurs in individuals of a nervous and irritable temperament, or when the attacks have been occasioned by fear or mental affections. They should only be given when the disease is connected with a depressed state of the system, and under such circumstances have been useful adjuncts to other remedies. As a principal means of cure, they have been found of little service, and are only beneficial in relieving pain, tremors, or great excitement during the intervals. Tobacco has been used in the form of clysters as a vermifuge, and conium was employed by Stoerck in the scrofulous complication of the disorder. Digitalis has been found serviceable in the cardiac variety, when the action of the heart is increased and readily excited by mental emotions.

Alteratives have been employed with a view of correcting the disposition to the attacks. Mercury has been given with this object, but unless the disease is complicated with some of the secondary forms of syphilis, or there is derangement of the biliary functions, it has not hitherto been very successful. The absorbent properties have been thought beneficial in removing serous effusions or other lesions in the coverings or substance of the brain or spinal marrow, and it may be employed for this purpose, although in epilepsy no great success ought to be expected from its employment. The preparations of iodine with mercury or iron may be administered with greater hopes of success when the disease is associated with scrofula. It should be remembered that these remedies are contra-indicated when there is much vascular excitement, and should at all times be given with caution.

Derivatives have often been found of great service. The use of the actual cautery, moxas, setons, issues, antimonial ointment, &c. has been attended with the best effects in cases connected with a plethoric constitution. Whenever the disease also has been attended by the drying up or disappearance of an old ulcer, fistula, eruption, &c. they are directly indicated. They should in general be applied to the nape of the neck or occiput when the cerebral symptoms are well-marked, and on each side of the spinal column when the convulsions are unusually violent or long-continued. Andral and some physicians advise their application to the limbs, particularly when the fit has been preceded by an aura.

Numerous other remedies have been administered, the action of which is not determined. Among these indigo has lately been introduced, and from some trials made by the physicians of the Charité Hospital at Berlin, may be prescribed with advantage in idiopathic epilepsy, or when the disease is uncomplicated with any organic lesion. Large doses are necessary, and the remedy should be continued for three or four months. An ounce, or even more, has been given daily, combined with tonics or with Dover's powder, to guard against diarrhœa. Dr. Roth has treated 31 cases, of whom 9 males and 5 females were cured, 11 relieved, while in 6 there was no amendment. (*Brit. and For. Med. Rev.*, vol. ii. p. 244.)

Surgical operations have in desperate cases been resorted to. Trephining the cranium has in a few cases been successful when circumscribed injury or disease of the bone was well-marked, and in one case tying the common carotid arteries was followed by temporary relief. (*Trans. of Med. and Phys. Soc. of Calcutta*, vol. vi. p. 390.) It is perhaps unnecessary to say, that such operations, particularly the latter, can be warrantable only in very extreme cases.

CATALEPSY AND ALLIED AFFECTIONS.

Definition.—*Symptoms.*—*Duration.*—*Varieties.*—*Catochus.*—*Ecstasy.*—*Lethargy or cataphora.*—*Coma.*—*Causes*—*predisposing*—*exciting.*—*Nature.*—*Diagnosis.*—*Prognosis.*—*Treatment.*

By *catalepsy* (derived from κατάληψις, a seizure, from καταλαμβάνω, to seize) is understood a sudden loss of consciousness and volition, the patient retaining during the attack the same position in which he happens to be at its commencement, or in which he may be placed during its continuance. This disease is so rare, that some physicians, and among others Cullen, imagined that it was always feigned. Its occasional occurrence is, however, now well established.

Symptoms. In general the cataleptic seizure is not preceded by any premonitory signs; occasionally there is lassitude, confusion of mind, headach, hallucinations, palpitations, vertigo, tinnitus aurium, yawning, stiffness in the neck, pain and slight spasms in the limbs.

During the attack, the patient is fixed and immovable as a statue, retaining the same expression of countenance and posture of the body as at the time of the seizure; the face is sometimes pale, sometimes slightly suffused; the eyes open or shut, but always fixed; the pupils usually dilated, but contractile from the stimulus of a strong light; the pulse generally quick and small, but sometimes slow and strong, while the action of the carotids is increased; the respiration is generally unaffected, but now and then quickened or embarrassed; the temperature of the surface is unequal, the head being hot, and extremities cold; consciousness and sensibility are entirely suspended, the most powerful stimuli failing to produce their accustomed effects; the voluntary muscles are passively contracted, and slightly rigid, but readily yield to the application of a counterbalancing power. Thus the head, neck, and limbs, may be placed in any posture, in which they are permanently maintained so long as the fit continues, although such posture may be one which, in the natural state, is very painful, and could only be continued a short time. Bouillaud has noticed that, on raising the limbs of cataleptics, they appear light, as if the patient assisted in the movement; but on depressing them, there is a certain resistance to be overcome. (*Dict. de Méd. et Chir. Prat.*) The evacuations are either suppressed, or passed involuntarily.

The duration of this state may be only a few minutes, but it may extend to several hours, or even days. This last occurrence is exceedingly rare. The symptoms or fits may recur at irregular intervals of days or months, or several times in the day. In a case related by Mr. Stearns (*Amer. Med. Reg.*, vol. i.) there were ten fits in the twenty-four hours, and in another by M. Bouvier (cited in *Nouveau Elémens de Thérapeutique de M. Alibert*, tom. ii.) there were more than a hundred accessions in the same space of time, there being a few minutes of interval only between each. The recovery is generally instantaneous, accompanied by sighing, but sometimes it is followed by more or less confusion of mind, headach, pain in the præcordia, and a sense of fatigue or uneasiness. The patient has no recollection of what has passed during the attack, and continues any occupation in which he had been engaged, or pursues the same train of thought as if nothing had happened. According to some writers, the sentence which was broken off by a sudden seizure, is taken up immediately on recovery from the paroxysms.

Such is the perfect form of catalepsy; but there are various modifications which have received different names. The consciousness may be only partially suspended, occasionally it remains perfect, while the slightest muscular movement cannot be exerted. This state has been called *catochus*, an instance

of which has been given by Dr. Fitzpatrick (*Duncan's Medical Commentaries*, vol. x.) in a woman, who was on the point of being buried alive, and felt all the horrors of seeing her own body prepared for interment. Similar cases are related by Pew, Deimerbroeck, Hildanus, and others. Occasionally voluntary motion is not entirely destroyed, the patients being able to move a hand or limb. In some cases deglutition may be excited by putting food into the mouth. When all consciousness and volition have disappeared, while the mind is in a state of excitement, the affection is termed by nosologists *ecstasy*. By this term, however, Dr. Good understood a loss of consciousness and volition, accompanied by such great muscular rigidity, that the limbs cannot be moved as in catalepsy. The term, however, is usually applied to the former group of symptoms, which may be accompanied either by muscular contraction or relaxation.

During the ecstatic attack the patient remains standing or sitting in a position expressive of great excitement; the eyes are immovably fixed, and impassioned expressions, fervent prayers, or absurd exclamations are uttered. Sometimes the individual sings with great pathos and expression. Chisholm relates a case in which this last symptom was present in a young female, in whom it alternated with mania. Dr. Copland was consulted about another in whom the disease was connected with hysteria; this patient sung and composed long doggerel strains. It is probable that the faculty peculiar to the Italian Improvisatori is sometimes associated with a morbid state similar to that now described.

When consciousness and voluntary motion only are suspended, and a state resembling sleep is present, from which it differs by being more prolonged, the affection is termed *lethargy*, and by some writers *cataphora*. The same state, when more profound, is denominated *coma*. This last affection (coma), however, is more properly cerebral than cerebro-spinal. A frequent recurrence of cataleptic or ecstatic fits may terminate in more severe affections, as epilepsy, apoplexy, mania, or confirmed insanity. In general they are complicated with hysteria, and sometimes with mania or epilepsy.

Causes. Catalepsy has appeared in both sexes, but females are much more predisposed to the disease than males, especially such as have a tendency to hysteria, melancholy, hypochondriasis, or mania. The affection may occur from the age of five years to that of advanced life. It is rare, however, before puberty and in old age. Cold has been thought by some to predispose to catalepsy; there are doubts, however, whether the cases recorded by Forestius and Sprengel, apparently caused by this agent, were true instances of catalepsy. The passions, if long-continued and violent, are the most frequent predisposing causes both of catalepsy and ecstasy; such as intense sorrow, unrequited affection, great anxiety, &c. Religious contemplations, particular trains of thought, especially those of an exciting description, too great mental application, excessive venereal indulgences, masturbation, frequent miscarriages, painful parturition, predispose to this affection, and whatever tends to debilitate the system or augment nervous irritation. The passions, when intense, act as *exciting* causes of this disease, also strong mental emotions, as terror, fright, anger, suppressed rage, indignation, and domestic inquietude; great mental application; ungratified desires, particularly that of love; religious enthusiasm; irritation of worms in the alimentary canal; disorder of the uterine functions; repulsion of eruptions; suppression of the menstrual or other discharges; sudden noise; fatigue; unaccustomed exercise; onanism, &c. Catalepsy is stated to have been induced in a girl, by taking away during a meal a choice morsel which she much desired. (Pinel, *Nosographie Philosophique*.) Tulp saw a young man become cataleptic on receiving the news that his marriage was broken off with a female he loved passionately. Jolly has seen it occur in a lady during the celebration of mass, on the elevation of the Host; and Dionis gives another somewhat similar instance of a monk who was performing the ceremony. (*Dissert. sur la Mort Subite et sur la Catalepsie*.)

Nature. As few individuals have died labouring under catalepsy or its allied affections, we know little of its morbid anatomy. In such as have been examined, either no unnatural appearances have been discovered, or such as in no way throw any light upon the peculiarities of the disease. Were we to reason from the analogy between this and other nervous affections, we should attribute the loss of consciousness and volition to congestion of the brain, as we observe the same causes which occasion this pathological condition in other affections, produce also catalepsy. But the muscular phenomena are wholly inexplicable from any known result of irritation. In catalepsy the general tone of the muscular system appears increased without intermissions, and as we have reason to suppose that this vital property is immediately dependent upon the spinal marrow, we may with great probability refer the peculiar phenomena to some alteration in that portion of the nervous system. Further than this, the present state of science will not allow us to go. We deem it unnecessary to discuss the views of M. Petitin and others, who believe in the transmission of the senses.

Diagnosis. Complete catalepsy is readily distinguished from all other diseases by the peculiar muscular phenomena described. But when these are not well-marked, and when the circulation and respiration are performed either feebly or with undue vigour, it may be mistaken for death, syncope, or asphyxia in the one case, or apoplexy in the other. It may be distinguished from death by applying the ear or stethoscope to the præcordial region, as the action of the heart, though diminished, must still continue. The condensation of the breath on a mirror held over the mouth will also assist in enabling us to detect it. The temperature of the body, state of the eyes and of the sphincters, mode of attack and previous knowledge of the case, may also guide us in our diagnosis. If the slightest doubt exist, there should be decided evidence of putrefaction before inhumation be allowed. Syncope may be known by the flexibility of the limbs, and the diminished action of the circulation and respiration. In asphyxia there is not only flexibility of the limbs, but a deep colour of the lips and countenance, circumstances which sufficiently indicate it. Apoplexy is distinguished by the flexible limbs, and occasional congestion of the head and face, stertorous breathing, and occasional paralysis.

We have already detailed the symptoms by which catalepsy may be known from ecstasy and lethargy. Ecstasy may be mistaken for somnambulism; but in the latter state the countenance of the individual is dull and inanimate, and in the former highly excited. Catalepsy in its imperfect forms, as well as ecstasy, has often been feigned with a view of escaping the naval or military service, or to obtain notoriety. The detection of these impostures must depend upon the acumen of the practitioner, and such experiments as the nature of the case may dictate to him.

Prognosis. Catalepsy is seldom dangerous, though it was thought so by Sennert, Vogel, and Boerhæave. Fatal cases, however, have been recorded by Lieutaud, Holier, and Ab Heers, but in general this event only occurs when it is complicated with some more serious malady. Pinel gives a case that terminated in apoplexy, and Rostan another which proved fatal from inflammation of the lungs.

Treatment. When there is evidence of plethora, with flushed face, quick pulse, hurried breathing, and heat of skin, general bloodletting is indicated, which may be followed, if necessary, by cupping on the back of the neck, or between the shoulders. If there be pains or uneasiness in the spine, the local abstraction of blood from the neighbourhood of the affected part by cupping or leeches is advisable. At the same time cold should be applied to the head, and active purgatives administered. If the catamenia be suppressed or irregular, cupping between the shoulders, the hip bath, and purgatives, should be employed. Cheyne recommends aloetic, and Dedier hydragogue cathartics in these cases, with which antispasmodics and injections containing turpentine may be combined. If the attack be induced by the suppression of an ac-

customed discharge, or by the repulsion of a cutaneous eruption, in addition to the above general remedies, issues, setons, blisters, or the tartar emetic ointment should be employed, so as to produce a drain from, or irritation on, the surface similar to that which existed before the seizure. In the intervals of the fits, the diet of the patient should be restricted; he should rise early, and use daily exercise short of fatigue. Wine, spirituous and fermented liquors, should be abstained from, and every cause of excitement, whether mental or physical, carefully avoided.

But when, as is most commonly the case, the disease is connected with an opposite state of the system, and there is paleness of the countenance, cool skin, weak pulse, feeble respiration, and other evidences of depressed vital action, tonics, antispasmodics, and stimulants with gentle aperients are indicated. During the intervals a nourishing and easily digestible diet should be allowed, and change of air, the shower bath, or sea bathing, regular exercise and agreeable mental occupations recommended. Any complication, as of hysteria, mania, epilepsy, &c. that may exist, must be treated on the principles recommended for the management of those diseases. When the biliary secretion is deranged, the gentle administration of mercurials is requisite. Should there be the appearance of death, artificial respiration, warmth to the surface, and the other remedies usually adopted in such cases must be actively resorted to. When the disease becomes chronic, counter-irritants applied to the occiput and spine are useful. Moral treatment is also essentially necessary; the passions, ideas, and meditations, which may have occasioned the disease, should be broken off or counteracted as much as possible.

SPINAL IRRITATION.

Explanation of the term spinal irritation. — Various anomalous symptoms. — Predisposing causes. — Exciting causes. — Nature. — Diagnosis. — Prognosis. — Duration. — Treatment.

THIS term has been used to designate an affection usually characterised by pain in the back, either induced or increased by pressure of the spinous processes of the vertebræ, accompanied by neuralgic and hysteric symptoms of a nature so variable as to simulate almost every form of disease to which the body is liable. Spinal irritation ought to be considered rather as an effect of disease, than as a malady *sui generis*, but as the subject is of the highest practical importance, it is proper to direct attention to it by giving a detail of its phenomena in this place.

Various forms of this affection have been described as cases of neuralgia, and termed *thoracic*, *epigastric*, or *intestinal*, according to the locality of the pain, by practical writers, especially Nicod (*Nouv. Journ. de Méd. Chir. et Pharm.*, tom. iii. p. 247. 1818), Teale (*On Neuralgic Diseases*), and Brown (*Glas. Med. Journ.*, 1828). They have been described in connection with hysteria by Tate (*Treatise on Hysteria*). The disorder has been called spinal irritation by Parrish (*Amer. Journ. of the Med. Sciences*, 1832), Darwall (*Midland Med. and Surg. Rep.*, 1829), Griffin (*On Functional Affections of the Spinal Cord*, &c.), Entz (*Rust's Magazin für die Gesammelte Heilkunde*, 1836), and Ollivier (*Sur la Moëlle Epinière*, 3d edit.). The term spinal irritation, although objectionable in many points of view, has been generally received, and is therefore retained in this place.

Symptoms. When it is remembered that the spinal cord furnishes directly

or indirectly nerves to every organ in the body, the numerous symptoms which may be produced by the increased, diminished, or perverted functions of one or more of these may be readily imagined. Hence the phenomena this affection presents differ according to the extent, seat, and intensity of this irritation, and are so greatly diversified as to prevent the possibility of giving a description which would be applicable even to the majority of cases. The only means we can think of for conveying a general idea of this disorder, is by referring to the different forms of hysteria, neuralgia, and chronic rheumatism. A combination of the symptoms occasionally presented by all three, constitutes spinal irritation.

The only constant symptom is more or less pain on pressing the spinous processes of the vertebrae. It may be confined to one spot, or be more or less diffused over the spinal column, pointing out the extent of the spinal irritation. In many cases the patient is unconscious of any thing wrong in the back, often denies the existence of pain in that situation, and refers all the uneasiness to the ultimate distribution of the nerves arising from the part. Sometimes there is a dull constant pain, which is overlooked, and thought to be wholly unconnected with the local complaint. When pressure, however, is made on the affected part, the pain in the back is increased, and not unfrequently the patient starts as if an electric shock had been received, or falls into a state of syncope. The seat of pain generally corresponds with the origin of the nerves ramifying on the organs, or portion of the surface complained of, although in some instances, as stated by Griffin, the morbid changes in the cord appear somewhat more extensive than the external tenderness. The local pain is often produced or increased by lifting heavy weights, or twisting the body, and has often been excited by jerks or slight concussions when walking.

In conjunction with the spinal tenderness there may be neuralgic pains, more or less diffuse, over different parts of the surface, diminished sensibility, convulsions, or paralysis; and as the functions of the different viscera and organs of the body are often impaired, various diseases are simulated. Thus women suffer neuralgic pains sometimes in the right, but more commonly on the left side, beneath the mamma; sometimes, again, the breast itself is more especially affected, constituting the irritable mamma of Sir A. Cooper. In other cases there is a feeling of numbness, as pointed out by Dr. Brown of Glasgow, or of constriction round the thorax, as if a walnut or other hard substance were pressed within a tight belt. Occasionally the affection commences with pain in the occiput, and rheumatic sensations in the neck and shoulders, several cases of which are given by Mr. Teale of Leeds. At other times, instead of neuralgic pains, there is a sense of numbness in the hands or feet, extending more or less over the extremities. We have seen a case where the only symptom was excessive coldness in the hands and fingers, that often amounted to actual pain, and prevented the individual from sewing, and carrying on her usual employments. If the spinal irritation be more severe, the internal organs participate, and the symptoms produced vary according to the portion of the cord that is affected.

When the spinal tenderness is confined to the cervical portion, there may be headach; loss of voice; neuralgic pains in the face and gums; trismus; various disorders of vision, as ocular spectra, muscae volantes, night blindness, &c.; more or less deafness, or confused sounds in the ears; diminished or perverted sensation of taste and smell; dysphagia; paralysis of the tongue; sickness; vomiting; loss of appetite; inordinate hunger or thirst; pain at the stomach; pyrosis; difficult breathing, cough, irregularity of the pulse; palpitations; disposition to syncope; paralysis of one or both arms, sometimes confined to the fingers, hands, arms, or shoulders; increased sensibility or numbness in those situations; pricking, formication, &c. Although these symptoms may have coincided at different times with cervical tenderness, it is evident that many of them, more particularly such as affect the special senses, arise from

irritation of the cranial portion of the cord. When vertigo or delirium is present in such cases, it is probable that the brain itself is more or less affected. When the irritation is in the dorsal region, the palpitations of the heart and dyspœa are more marked; there is sometimes dry cough; pleurodynia; pain under the clavicles, in the shoulders and superior extremities; sense of constriction in the thorax, often like a tight band; neuralgic pains in the side; diminished sensibility in the breast and epigastrium; more or less derangement in the digestive organs, &c. When it is situated in the lumbar portion, the symptoms are, pain in the parietes of the abdomen, hypogastrium, loins, and genito-urinary apparatus; symptoms resembling gravel in the kidneys, ureters, or bladder; irritable uterus; cramps and increased sensibility, or palsy more or less complete in the inferior extremities.

When the spinal irritation is more diffused, there is an admixture or combination of the above symptoms. Hence the occasional difficulty experienced in tracing the various undefined symptoms to their true source. Cases of angina pectoris, asthma, different forms of neuralgia and hysteria, spasmodic croup, convulsions, hydrophobia, epilepsy, tetanus, chorea, paralysis, spasmodic colic, diarrhœa, cholera, irritable bladder, &c. are recorded by Griffin, all of which have been connected with the spinal irritation, and disappeared on its departure. It often happens that the spinal tenderness shifts its position, when the other symptoms change also. A remarkable case is detailed by Griffin of a young lady, in whom the symptoms successively assumed the appearances of organic lesion of the lungs, heart, and abdominal viscera, together with an endless variety of other complaints of a neuralgic, asthmatic, epileptic, cataleptic, and paralytic nature. Indeed the singular changes the disease undergoes, render it impossible to obtain a perfect knowledge of its numerous forms, without studying in detail the extraordinary cases which have been recorded of it.

Causes. Women are much more predisposed to this complaint than men, and young girls more than married women. Of 248 cases given by Griffin, 26 were males, 49 married women, and 73 girls. In a table of 154 cases (given in the same work), we have determined that one occurred at the age of 4 years, that there were 7 between the age of 10 and 15; 18 between 15 and 20; 31 between 20 and 25; 15 between 25 and 30; 17 between 30 and 35; 18 between 35 and 40; 14 between 40 and 45; 12 between 45 and 50; 7 between 50 and 55; 3 between 55 and 60; 5 between 60 and 65; and 6 whose ages are not recorded.

This disorder, therefore, is most frequent between the ages of fifteen and fifty—the menstrual period of women. Spinal irritation has been observed in every habit and constitution,—in the full and plethoric, as well as in those who are spare and delicate. In almost all, however, who have been affected, somewhat of the nervous temperament has been remarked, or at all events a peculiar excitability of the system. The most common *exciting* causes are uterine disorder; exposure to cold and moisture; dyspepsia, worms, and other sources of irritation in the alimentary canal; affections of the liver, mental emotions; erysipelatous, rheumatic, and eruptive fevers; local injuries, &c.

Nature. As spinal irritation uncomplicated with other disease rarely terminates fatally, the exact anatomical characters of this affection are unknown. There can be little doubt, however, that in the majority of cases the symptoms are referrible to a state of congestion of the spinal cord or its investing membranes. Ludwig and J. P. Frank have alluded to the effects of spinal congestion, and the anatomical circumstances which favour its occurrence. The latter, in particular, has pointed out the absence of valves in the spinal vessels, together with their peculiar distribution on the surface of the cord. Their anatomical structure and arrangement render them peculiarly liable to congestion, as the venous blood must ascend in opposition to gravity. They are also equally pressed on by the cerebro-spinal fluid in a state of health, and any cause which tends to increase or diminish its normal quantity,

may readily be conceived to produce venous congestion. Hence, derangements in the menstrual function, and the various causes which have been mentioned, frequently occasion dorsal and lumbar pains, with other symptoms of spinal irritation. The vessels being principally superficial, unless very much dilated, occasion only partial pressure, and consequently increased action followed by the principal phenomena of this affection, viz. neuralgic pains. That motion is not so commonly increased or diminished, may be attributed to the relation of the cord with the osseous walls which surround it, as pointed out by Ollivier, for the anterior columns are almost immediately applied to the bone, while the posterior are five or six lines distant from it. Independent of any positive evidence, therefore, it may be said that the theory of congestion is fully capable of explaining the phenomena, and is the morbid condition which of all others we should expect to follow the known causes of the disorder. On the other hand we cannot, with some authors, suppose it to be chronic inflammation, for the changeable nature of the affection, and its sudden appearance and disappearance, are opposed to such an opinion. With regard to the spinal tenderness, it has been well-pointed out by Mr. Locock (*Edin. Med. and Surg. Journ.*, No. 136.), that "an inspection of the vertebral column in an anatomical subject will show at once how impossible it is to press the cord or the nerves going from it, in the slightest degree." We cannot think with him, however, that "tenderness of the spinal marrow is a sign of little value," as numerous cases prove that there is a connection between the situation of the local tenderness and other symptoms, while local treatment has dissipated the disorder, when remedies directed to the removal of its more remote effects have failed. No doubt the spinal irritation is in itself only a symptom, although one which indicates with tolerable certainty the origin of the malady, and as our pathological knowledge improves, there is every reason to suppose that this view of its pathology will be generally admitted.

Diagnosis. It is remarked by the Messrs. Griffin, that there does not appear to be any complaint to which the human frame is liable, whether inflammatory or otherwise, which may not occasionally be imitated in disturbed states of the cord, and hence it is a prolific source of those complaints called hysterical or nervous. The same authors have given the following diagnostic symptoms, by which it may be distinguished from organic disease:—1. The pain or disorder of any particular organ being altogether out of proportion to the constitutional disturbance. 2. The complaints, whatever they may be, usually relieved by the recumbent position, always increased by lifting weights, bending, stooping, or twisting the spine; and among the poorer classes, often consequent to the labour of carrying heavy loads, as in drawing water, manure, &c. 3. The existence of tenderness at that part of the spine which corresponds with the suffering organ. 4. The disposition to a sudden transference of the diseased action from one organ or part to another, or the occurrence of hysterical symptoms in affections apparently acute. (*Opus cit.* p. 214.) Attention to the four circumstances above enumerated, will generally enable the practitioner to identify this disorder. It may readily be mistaken for disease of the vertebral bones, as there is not unfrequently an apparent prominence of the vertebrae, where the tenderness is felt. As such an error may lead to very distressing consequences, it will be well to enumerate the circumstances which distinguish the one from the other. In vertebral disease the prominence is angular, and depends on displacement of the bones or curvature: in spinal irritation it is round, and is occasioned by slight swelling of the ligaments or coverings of the spine: in diseased vertebra there are seldom hysterical symptoms in young females, whereas they are common in spinal irritation. Disease of the vertebra is most common in young persons of a strumous constitution, whereas spinal irritation is most frequent in adults. Lastly, complete paralysis is common in vertebral disease, rare in spinal irritation, and in the latter, the general health is not so much affected.

Prognosis. The prognosis in spinal irritation is always favourable, as there

is every reason to believe that the mere state of irritation uncomplicated with a more serious morbid lesion has never proved fatal. When there is any other coexisting disease, the prognosis of course is the same as that of the particular affection with which the spinal irritation is complicated.

The *duration* of the symptoms is very variable, and may continue from a single day to three or four years. A case is given by Griffin where it continued four years and a half; according to whose experience, a quick and irritable pulse and furred tongue are indications of an obstinate and troublesome attack.

Treatment. The various and often contradictory symptoms induced by spinal irritation, render its diagnosis and treatment difficult and uncertain. Numerous facts, indeed, attest that individuals have long laboured under rheumatic, neuralgic, and hysterical complaints, during which they have suffered the greatest tortures, although they have been relieved in a few days by treatment directed locally to the spine. Whatever difficulties, therefore, may exist in drawing a line of demarcation between the effects of spinal irritation and numerous other disorders, notwithstanding the obscurity that rests on the precise nature of the morbid change which produces it, the great practical utility to be derived from its study is unquestioned. So fully are we impressed with its importance, that we consider that in all cases of neuralgia, rheumatism, and hysteria, the spine should be examined; while, perhaps, there is scarcely a functional disorder to which the young female is liable, which may not occasionally be found connected with spinal irritation. We have often had an opportunity of observing the manner in which numerous disorders have been traced to this source, and feel assured that if practitioners in general would pay greater attention to this complication, many of the extraordinary and anomalous cases which are at present the cause of great embarrassment in practice, might terminate in the speedy relief of the patient, and increased credit of the physician.

It must not be supposed, however, that the difficulty terminates, even when the disease is found to be connected with spinal irritation, for experience has demonstrated that this is in itself not unfrequently a secondary effect, produced by the disordered functions of other organs. The first object of the medical attendant, therefore, should be to determine whether the affection is idiopathic or sympathetic, acute or chronic.

When the disorder is idiopathic, our attention must be directed to the restoration of the general health of the patient, and an antiphlogistic or tonic line of treatment determined on according to the circumstances of the case. Accordingly, the application of leeches, or cupping over the spine where there is tenderness, or stimulants and counter-irritants, should be employed, according to the general strength of the patient, and the acute or chronic nature of the disease. In many cases the loss of blood by leeches has been sufficient to remove the symptoms; in others counter-irritation, as by blistering or the tartar emetic ointment, has succeeded. The latter is particularly recommended by Mr. Tate, and may be used with every hope of benefit. But when the affection is sympathetic, as is generally the case, in addition to the above means, the origin of the malady is to be anxiously sought after, and remedies administered which are calculated to remove it. By far the most common cause in females is derangement in the menstrual discharge, and, under such circumstances, the endeavours of the medical attendant should be directed to promote the due performance of this function. If there be irritation in, or improper action of, the digestive or biliary organs, the disordered state should be combated by appropriate remedies. Every medicine employed should have reference to the state of the system, and constitutional powers of the individual, and a low or nourishing diet prescribed accordingly. In persons of an irritable temperament, change of air, exercise, congenial society, and all methods of distraction, should be recommended. In chronic cases, the disease is often very intractable, but if it have been previously treated in an injudicious

manner, much may be effected by the above means. If there be much pain or watchfulness, anodynes are useful: hyoscyamus and belladonna should be preferred, opium often increasing the irritability. In other respects the treatment should be conducted on the principles laid down under HYSTERIA and NEURALGIA, with which disorders spinal irritation is almost inseparably connected.

SPINAL MENINGITIS.

Definition.—*Symptoms*—*of the acute form*—*of the chronic form.*—*Causes.*—*Anatomical characters.*—*Nature.*—*Diagnosis.*—*Prognosis.*—*Treatment.*

INFLAMMATION in the membranes investing the spinal cord is an affection which exists very rarely without accompanying disease in the substance of the cord, or in the membranes of the brain. Occasionally, however, it occurs alone, and appears to be as readily distinguished from inflammation of the substance of the cord (myelitis) as cerebral meningitis is from cerebritis. Observation has shown that there are no signs by which it is possible to distinguish inflammation of the membranes of the spinal cord, that is, inflammation of the dura mater from that of the pia mater, although Professor Albers of Bonn has attempted to do so. (*Journal für Chirurgie und Augenhulkkunde*, vol. xix. cap. 3.) The symptoms, therefore, must be considered common to inflammation of both these membranes.

Symptoms. Acute spinal meningitis generally commences with sensation of weight and fatigue in the limbs, often attended with constipation, and occasionally with dysuria, or even retention of urine. These symptoms are followed by pain in the back, more or less severe, most commonly in the lumbar region, which is at first of a dull description, but becomes rapidly more acute, and extends to the limbs; the pain is sometimes lancinating, arising from a fixed point in the back; in other cases it is not so concentrated or severe when the patient is at rest, but is greatly increased by the slightest motion, a circumstance that often gives rise to the impression, that the affection is rheumatism. According to Ollivier, the pain is not augmented by pressure; sometimes it is continued; occasionally there are complete remissions, and the patient almost always avoids muscular motion, from the fear of increasing it. On the occurrence of the pain, there is often a sense of constriction in the neck, back, or loins, according as the membrane is inflamed in either of those situations. As the disease advances, there are convulsive contractions of the neck and posterior part of the trunk; sometimes there is complete opisthotonos, or a considerable degree of rigidity in the muscles of the back, in which occasionally those of the limbs participate. These movements may come on without any apparent cause, but they are most frequently excited by change of position. In other instances, there is trismus or convulsions, or rigidity of the extremities, with pain throughout their whole extent. Paralysis of motion is mentioned as a symptom by some authors; but there is every reason to believe that in these cases the cord itself is affected. The respiration is laborious or hurried; the pulse, at first natural, becomes rapid, small, and feeble; while the motions of the heart are strong and frequent: these symptoms are generally accompanied with hot skin, thirst, and loaded urine. When the tetanic spasms are intermittent, there is generally abundant perspiration, which becomes more profuse as the disease advances towards a fatal termination. At a later period, the pulse becomes smaller and more irregular; the tongue and mouth dry;

the fæces and urine are passed involuntarily; the dyspnœa is more urgent; and drowsiness, delirium, convulsions, with increase of the tetanic spasms, passing into coma, precede the fatal issue.

The progress of these symptoms is usually rapid, if not checked by proper treatment, although its duration varies according to the intensity and extent of the inflammation. It is generally fatal from the fifth to the fifteenth day. Some cases, however, have been recorded by Ollivier, which have been fatal as early as the fourth, and others which have been prolonged to the twentieth or thirtieth day.

In *chronic meningitis* of the spinal cord, the symptoms are developed more slowly. They consist generally at first of obscure dorsal pains, with a sensation of constraint and fatigue in the limbs; sometimes there is morbidly acute sensibility of the cutaneous surface; occasionally pain in the bowels, which is often so severe as to be considered and treated as the primary disease: sometimes there is palpitation of the heart, with dyspnœa, and other anomalous symptoms, so that the spinal disease is very apt to be overlooked. The pain in the back in some instances becomes suddenly increased, or there are distinct remissions or even intermissions; in others it becomes acute, and the patient is carried off with the same symptoms as characterise the last stage of the acute form just described. In both varieties there is usually more or less rigidity of the limbs, with contraction. Poletti has given a case, where, from contractions of the cervical muscles, the head was drawn forcibly down to the right shoulder six months before death. (*Ann Univ. de Méd. de Omodei*, Nov. 1825.) M. Ollivier has observed, that eschars on the sacrum are not so common in this as in other spinal diseases of long standing.

Causes. The causes of this affection are often very obscure, and in some cases not discoverable. All mechanical injuries are capable of producing the disease, as fractures and dislocations of the vertebræ; violent blows and contusions on the spine, or concussion from falls on the feet and on the nates: it may also supervene on cerebral meningitis, the inflammation apparently extending to the membranes of the spinal cord. Suppression of the menses, hæmorrhoidal hæmorrhages, and of accustomed discharges; chilliness of the body, and sudden changes of heat and cold, have sometimes been supposed to have occasioned it. Cases are given by Ollivier and Bergamaschi, where it followed violent efforts to lift heavy weights. Lastly, individuals subject to rheumatism have been found peculiarly predisposed to this disease.

Anatomical characters. After *acute meningitis* of the spinal cord, the membranes are usually injected, the red colour being more or less intense, and principally confined to the pia mater, while the arachnoid is rendered opaque by the thickening of the cellular tissue contiguous to it. No vessels have yet been found in this membrane, and consequently the red appearance it often presents arises from an injection of the tissue below it. These signs of inflammatory action are generally found throughout the whole extent of the spinal cord, although sometimes they are more or less circumscribed or limited to spots, an appearance usually found when inflammation has been the result of mechanical injury to the bones. When the dura mater is laid open, there is often effusion of yellowish white lymph, giving the cord, as pointed out by Ollivier, an appearance of enlargement and density. It is always thicker posteriorly than anteriorly, this thickening being sometimes conjoined with a collection of sero-purulent fluid; occasionally there is effusion of pus, but, as noticed by Ollivier, it is rarely found in the cavity of the arachnoid, but generally between that membrane and the pia mater. J. Frank has shown that dropsy of the cord may result from acute inflammation of its membranes. The dura mater is sometimes injected and more or less thickened. Professor Albers of Bonn has seen it of a cinnabar colour in two cases, accompanied with serous and purulent effusions. (*Mém. cit.*) Ollivier, Lallemand, and Bergamaschi, have found serous fluid accumulated between it and the bones. Constant has observed pus in the same situation. (*Gaz. Méd.*, 1835, p. 74, 75.)

In *chronic* meningitis, besides one or more of the above appearances, there is generally adhesion of the arachnoid to the pia or dura mater, and not unfrequently cartilaginous plates, generally small and numerous, in the arachnoid, between it and the pia mater. It is very rare that any of the above signs of inflammation are confined to the membranes of the cord in general, they are found likewise in those of the brain, or in the substance of the spinal marrow.

Nature. The symptoms of this affection are readily explained by the morbid appearances discovered after death. The inflammation produces irritation and the symptoms of increased action which follow. Paralysis, when present, is to be attributed to pressure on the spinal cord, which not uncommonly participates in the inflammatory action, constituting meningo-myelitis. (See MYELITIS and HYDRORACHIS.)

Diagnosis. According to Ollivier, inflammation of the meninges is to be distinguished from inflammation of the structure of the cord (myelitis), by the acute pain in the back, increased by motion only, and by the tetanic rigidity of the muscles, while in the latter (myelitis), the pain is augmented on pressure, with diminution of sensibility, with more or less paralysis.

Apoplexy of the spinal cord is recognised by the sudden occurrence of vertebral pain, tetanic rigidity, convulsions, or paralysis. The pain is increased on pressure, which is not the case in meningitis. In some cases there are no tetanic spasms, the pain is fixed and not liable to remission, while the general sensibility is often diminished.

Cerebral meningitis is distinguished by the headach, delirium, injected countenance, intolerance of light and sounds, intense thirst, and general symptoms of fever. Chronic spinal meningitis is known by the slow progress of the symptoms, the intelligence being unimpaired. In the early stage it is with great difficulty diagnosed from rheumatism, and in many cases it cannot be distinguished until the more urgent symptoms appear. Its principal character is tetanic rigidity, whereas in chronic myelitis there is more or less paralysis.

Prognosis. Spinal meningitis must always be looked upon as a most dangerous disease; by some authors it has been considered incurable. J. Frank, however, has published a case that was cured by antiphlogistic remedies (*Prax. Med.*, vol. v. p. 76.), and Ollivier has found thickening of the spinal membranes in an epileptic, who died of some other disease. We have seen an instance of acute spinal meningitis under the care of M. Cruveilhier at the Salpêtrière, which completely recovered. These cases, however, are exceedingly rare; and when the malady is fairly established, the prognosis is always most unfavourable, if not fatal.

Treatment. In the acute form, general and local bleeding is obviously indicated, and should be vigorously employed, so as to produce a marked effect on the pulse, especially if the patient is strong and of a plethoric constitution. Leeches or cupping-glasses should, with or without venesection, be applied over the part which is the principal seat of pain. M. Goss recommends deep incisions on each side of the spinous processes, with a view of opening the veins that communicate with the spinal cord (*Des Maladies Rhumatoides*, p. 231.); we have no proof, however, of the benefits of this severe treatment. Purgative injections, containing a large quantity of fluid, should be given occasionally; purgatives by the mouth, especially such as are of a drastic nature, being contra-indicated, on account of the straining, during their operation, increasing the pain and tetanic spasms. Ollivier advises the cold affusion, or the application of ice to the spinal column, which he says ought to be as beneficial in spinal as in cerebral meningitis; no facts, however, are given in support of this opinion. Warm pediluvia are beneficial, and should be continued some time, care being taken to support the patient in an inclined position, and to prevent, as much as possible, all unnecessary motion. The catheter should be introduced three or four times a day, to prevent accumulation of urine, and the consequent decomposition this fluid is liable to undergo

in the bladder when long retained. Antimonials are hazardous, from their liability to occasion vomiting. If acute pain continue after the employment of the above means, anodynes and hypnotics may be given to relieve it and procure sleep. Absolute rest in the horizontal posture is essentially necessary. A severe antiphlogistic diet must be rigorously persevered in. In the chronic form of the disease, cupping in the neighbourhood of the seat of the pain, may be occasionally employed, followed by counter-irritation, extending over a greater or less surface according to the severity of the symptoms. With this view, moxas, issues, setons, tartar emetic ointment, or the actual cautery, may be employed, so as to keep up a constant irritation and discharge from the part. Blisters are objectionable, as in some cases they occasion strangury and increase the general irritation. From numerous instances we have seen of the effects produced by the actual cautery in diminishing chronic inflammation, we are convinced that it is not only the most efficient, but, on the whole, the least painful mode of applying counter-irritation. The pain, though severe for a time, is not long continued, and on this account, is less in the aggregate than that occasioned by other kinds. In the hands of Professor Syme of Edinburgh, it has frequently succeeded in curing chronic inflammation of the joints, when all other means had failed; and in two cases of chronic spinal meningitis, occasioned by diseased vertebræ, we have seen it produce a complete cure. The triangular cautery of Rust should be applied, at a white, or an intense red heat, for two or three inches on each side of the spine, where the pain is most intense, so as to produce a deep eschar. When the slough separates, water dressing is all that is necessary.

The cold or tepid sea-water douche, or a weak saline solution, poured from a jug or tea-kettle over the spinal column, may be also employed.

Absolute rest in the horizontal posture is also necessary in this form of the disease, and great attention should be paid to the daily change of cushions and air-pillows, so that the formation of sores on the sacrum and back may be prevented as much possible.

MYELITIS, OR INFLAMMATION OF THE SPINAL CORD.

Definition.—*Symptoms of acute myelitis—of chronic myelitis.*—*Causes.*—*Anatomical characters.*—*Nature.*—*Diagnosis.*—*Prognosis.*—*Treatment.*

By this term (from *μυελος*, *medulla spinalis*) is understood inflammation of the spinal cord. The disease has received various names from different authors. It is called *notamyelitis*, by F. Hildenbrandt; *spinitis*, by several French writers; *rachialgitis*, by Brera and J. Frank; *mielitide stenica*, by Bergamaschi, &c. The two last authors, however, have not distinguished this affection from spinal meningitis. The term *myelitis*, first used by Harles (*Dissert. Inaug. Méd. de Myelitide*, Erlangen, 1814), and subsequently adopted by Khloss (*Dissert. de Myelitide*, Halle, 1820), Ollivier, Andral, and others, is the best, and the one most commonly used.

Symptoms. The symptoms of *acute myelitis* vary considerably, according to—1. The period and intensity of the disease; 2. The portions of the cord inflamed; and, 3. The extent to which it may be complicated with spinal meningitis.

1. If the inflammation be not very severe, the first symptoms are numbness and a sensation of cold in the fingers or toes, accompanied with pain and difficulty of moving them. These symptoms gradually affect the upper and lower extremities, and extend to the trunk. Sometimes there is obscure

pain in the course of particular nerves; formication; feebleness of the muscles or a kind of subsultus; constipation; retention of urine; affections of the heart; and more or less derangement in the functions of other internal organs, which are often thought to be the primary diseases, while the state of the spinal marrow is overlooked. Under these circumstances, firm pressure or percussion applied to the spinous processes successively, or passing a sponge saturated with hot water along the spine, (as recommended by Mr. Copeland,) will generally detect the seat of the disease. If the inflammation be more active and intense, the disease commences with partial or general convulsions without numbness, while acute pain is felt in the back, extending along the course of the nerves. Sometimes the convulsions are clonic, and in some instances of the tonic character, but there are strong reasons for supposing, that, if there be tetanic rigidity, the meninges are also affected. As the disease advances, and disorganisation occurs, there is paralysis, with diminution or complete loss of sensibility. The bowels are generally costive, and the urine is either retained or passed involuntarily; the latter generally occurring during convulsions. Sometimes the paralysis commences in the inferior extremities, and gradually proceeds upwards, until all the respiratory muscles become affected, and the patient dies asphyxiated. Occasionally, but more rarely, the paralysis appears first in the superior, and subsequently in the inferior, extremities; in some cases it is confined to one side of the body only, or to a single extremity. In general, motion and sensibility are lost together, but sometimes the one is paralysed without the other. Not unfrequently, paralysis appears first on one side of the body, and then on the other; or one foot, leg, hand, or arm, may be affected, according to the situation or extent of the disease. The different paralytic phenomena are treated of more at length under PARALYSIS.

2. The general symptoms above detailed are liable to greater or less alteration, according as the inflammation is seated in the cranial, cervical, dorsal, or lumbar portion of the cord.

When the *cranial* portion of the cord is affected, the patient experiences a sense of pricking, and of formication in one or more of the limbs; deep-seated headach; greater or less affection of the special senses, as obscurity or loss of sight, hearing, or smell: sometimes there is delirium; trismus, or convulsions; grinding of the teeth; red and dry tongue; difficulty of swallowing; vomiting; embarrassment, or loss of speech; frequent and convulsive respiration: in some instances, symptoms resembling hydrophobia have been observed, or irregularity in the heart's action and in the pulse; hemiplegia, or other form of paralysis. As the fatal stage advances, the prostration increases; the pulse becomes more feeble; the dyspnoea increased; and the excretions are passed involuntarily.

When the *cervical* portion of the cord is the seat of inflammation, the symptoms are—difficulty of deglutition; impossibility of supporting the head (*Vogel*); acute pain in the back of the neck; difficult and hurried breathing, the functions of respiration being principally carried on by the contractions of the diaphragm; palpitations; frequent hard pulse; pricking sensations in the fingers or hands; paralysis of the superior or inferior extremities, sometimes of the former only, gradually extending to the muscles of the trunk; and before death, the usual symptoms of failure of the vital powers.

When the superior part of the *dorsal* portion of the cord is the seat of the disease, there is pain in the dorsal region; convulsive movements of the trunk; palsy of the arms and lower extremities; short and laborious respiration, principally carried on by the external respiratory muscles; palpitation, or tumultuous and irregular actions of the heart, &c.

When the *lumbar* portion, or lower part of the dorsal region is affected, which is the most common seat of the disease, besides a greater or less number of the above symptoms, the loss of motion and sensibility in the inferior extremities is more marked; there are deep and severe pains in the lower part of the back; pain in the abdomen, resembling colic; convulsive contractions

of the abdominal parietes; sensation of tightness above the pelvis, as if constricted with a band or cord. Paralysis of the bladder and sphincter ani also is a prominent, as well as one of the earliest symptoms.

3. When myelitis is complicated with spinal meningitis, constituting meningo-myelitis, the symptoms above described are conjoined with those characterising inflammation of the membranes, such as increased pain on the slightest motion, and more or less tetanic rigidity. The inflammation in these cases is often of greater extent, and the pain is not confined to a circumscribed spot. There are also not unfrequently febrile symptoms, the pulse being quick, strong, and irregular, the skin hot, the tongue foul and dry, and the respiration laborious and frequent. Abercrombie (case 147.), J. Frank, Bergamaschi, and others, have confounded cases of this affection with myelitis or simple inflammation of the cord.

The *duration* of acute myelitis is variable, usually proving fatal from the fifth to the tenth day. Cases are not uncommon where this event has occurred on the third or fourth, and a few are recorded where death has taken place in fifteen or twenty hours. The symptoms are more intense, and the disease more rapidly fatal, when the dorsal portion of the cord is affected, a fact observed by Mr. Earle (*Phil. Trans.*, 1822) and by Ollivier, and attributed with much reason by the former to the small size of the cord in this situation.

The symptoms of *chronic* myelitis are essentially the same as those which characterise the acute; they come on, however, more slowly, and at the commencement are more obscure and difficult of detection. In many cases, long before any pain is complained of in the back, there is a feeling of numbness, pricking, formication, loss of strength, or other obscure symptoms in the fingers, hands, toes, legs, thighs, and other parts of the muscular system. Sometimes there is increased sensibility in these parts. When pain occurs in the back, it is often for a long time considered to be rheumatism, and is generally mistaken for lumbago or sciatica. The numbness and weakness are generally greater on getting up in the morning, and are often lessened by exercise; the power of motion and muscular strength being also temporarily increased, a circumstance ascribed by Ollivier (vol. ii. p. 427.) to a state of congestion which is favoured by long repose, and in some measure dissipated by increasing the activity of the circulation. The gait of persons affected with chronic myelitis is peculiar, and thus described by Ollivier:—"Each foot is lifted from the ground with difficulty, and in the effort which the individual makes to do this and carry it forward, the trunk is first straightened, and then thrown back, as if to counterbalance the weight of the inferior extremity, which vacillates involuntarily before it is again placed to the ground. Sometimes the point of the foot is drawn downwards, and is more or less dragged on the ground before it is lifted, while, in other instances, it is raised quickly, and at the same time thrown outwards." When there is incomplete paralysis of the fore-arm and hand, objects are obscurely felt, seized with difficulty, and readily fall from the patient's grasp. Complete paralysis is slow in its approach, and is often limited for a long time to one or even to a portion of the extremities, which gradually becomes rigid, and is extended with difficulty and pain. Sometimes there is no rigidity or contraction, but slight pain in the affected limb on motion, or on pressing the hand on the course of the nerves. In the paralysed parts there is often a perceptible diminution of temperature, and an absence of cutaneous transpiration, rendering the skin dry and scaly. In many cases the heart is much affected, the strength of its contractions being increased and its action tumultuous, while the pulse is weak and irregular. In others there is difficulty of breathing, and the patient is frequently almost suffocated. Ollivier considers that this disease is often the cause of idiopathic asthma. There are occasionally symptoms resembling those of angina pectoris, the paroxysms being in some instances preceded by pain and numbness, extending from the arms to the chest, and in others from the chest to the arms. There is often colic pain, with contractions of the abdomen; cramps in the stomach; painful spasms of the abdominal parietes;

sometimes a sensation of constriction, as if a cord was tied tightly round the trunk, with the knot over the spine. There is almost always constipation and retention of urine, which, as the disease advances, is changed into inability to retain the excretions. In the generality of cases, large eschars and sloughs form on the back, under the exhausting discharges from which the patient sinks. The intelligence is unaffected throughout, unless the brain participates in the disease.

The *duration* of chronic myelitis is generally from one to four years, the immediate cause of death being most generally exhausting discharges from large sores in the sacrum. Some, however, die of gradually increasing debility without these sores; and in others death has been occasioned by a true asphyxia. Individuals have existed under this affection for fifteen or twenty years, with perfect preservation of the intelligence.

Causes. Myelitis (to which males appear to be more liable than females) may be occasioned by falls and blows on the vertebral column; fractures and displacements of the vertebræ; alterations in the bones and ligaments by caries, scrofula, or rachitis. It has been observed by Ribes to follow rheumatism (*Dict. des Sciences Méd.*, art. VERTEBRÆ); and by J. P. Frank (*De Curandis Hom. Morb. Epitome*, vol. x. p. 50, 51.) and Ollivier, cerebral meningitis, pneumonia, and inflammation of the digestive organs. It may also be caused by sudden changes of temperature, and long exposure to cold and tempestuous weather. Great fatigue and excessive muscular exertion have produced it. MM. Dupuy and Bouley have pointed out its frequent occurrence in the lumbar region of horses subjected to much labour. It has followed also excessive venereal indulgences. Hourtet gives a case where it depended on the venereal disease, and disappeared when the original affection was cured. (*Mém. de l'Acad. Roy. de Chir.*, tom. iv. p. 141.) In a great number of cases, however, myelitis cannot be attributed to any apparent cause.

Anatomical characters. It is rare that death takes place in the early stages of inflammation of the spinal cord; but there is every reason to believe, from the analogy of its structure with that of the brain, that it presents the same appearances as the latter organ. Mr. Stafford describes it when occurring after injuries of the spine as being redder than natural, presenting bloody points when cut into, which, as Dr. Todd has remarked, implies that he has seen the lesion in its early stage. In general, however, the results of inflammation are discovered; such as softening, induration, and suppuration. Softening may exist in any portion of the spinal cord, but it is most common in the lumbar region, and next in the cervical. It presents the same characters that we have described as belonging to softening of the brain, and there are the same doubts in many cases regarding its inflammatory origin. In some instances it occupies only the posterior columns, in others the anterior, but in general, as remarked by Ollivier, the central portions are most affected, though there is obviously much difficulty in establishing whether it is ever confined to the grey matter, as that writer supposes to be not unfrequently the case. Sometimes the whole thickness of the cord is destroyed and reduced to a thickish fluid or pulp, in which no traces of nervous matter can be discovered; in other cases it is only partially destroyed, and fibres of medullary matter can be traced through the softened mass; or with more or less softening, the cord has been found flattened by pressure; for example, by an exostosis. (Janson, *Compte Rendu du Grand Hôtel Dieu de Lyon*, 1822.) Induration is also sometimes met with, most generally in chronic cases, although Bouillaud considers it a change that often precedes softening. (*Sur l'Encephalite*.) Occasionally, when the cord is indurated, it is also atrophied. Hutin relates a case of chronic myelitis, where the cord was indurated and atrophied, so that it exactly resembled a ligamentous cord. (*Nouvelle Bib. Méd.*, an 1823, tom. i. p. 24.) Sometimes the volume of the cord is increased, as noticed by Bergamaschi, Portal, Laennec, Abercrombie, Ollivier, Andral, Hutin, and others. In some instances the induration is connected with increased vascular action in the part and neigh-

bouring structures, as pointed out by Bergamaschi and Portal; in others it is deprived of all colouring matter, resembling the white of egg, as remarked by Esquirol and the younger Pinel. In a case by Somenkalb, of induration of the cord, it was hypertrophied in the cervical region, the remaining portion being in a state of atrophy. (*Carus Zeitschrift für Natur und Heilkunde*, tom i. p. 5. 2d year.) Suppuration in the spinal cord is a result of inflammation, which is very rarely met with. Velpeau met with two distinct abscesses, one in the right, the other in the left column; the former three inches long, and two or three lines in diameter; the latter one inch long, and one line in diameter. (*Rév. Méd.*, 1826.) In a case published by Mr. Hart of Dublin, the spinal cord was enlarged in size. On cutting it open, thick purulent matter, which was contained in a cyst, flowed out, occupying the centre of the spinal marrow, extending from the first to the eleventh dorsal vertebra; its diameter was about four lines. (*Dub. Hosp. Rep.*, vol. v.) Dr. Carswell has seen two abscesses in the cord; one on the right side, five inches long and a line in diameter, and another on the left side, an inch long. (Carswell, *Path. Anat.*)

Nature. In the greater number of cases the morbid appearances readily explain the symptoms, according to the general laws of the pathology of nervous diseases formerly alluded to in the preliminary observations, the early inflammation producing irritation, and causing pain, convulsions, and other symptoms of increased action, while the loss of motion and sensibility are in proportion to the amount of pressure on, or destruction of, the different affected portions of the cord. The great majority of the cases also are in perfect accordance with our knowledge of anatomy, and the numerous experiments performed on animals. Some however have occurred, in which, when the cervical portion of the cord only has been affected, there has been palsy in the superior extremities above, while the inferior have remained in their natural state, readily obeying the influence of volition; on the other hand, the lower limbs have been affected while the upper have remained unaffected. These instances are rare, and are only to be explained by supposing that the few fibres not implicated in the organic lesion are capable of performing their usual office of conductors,—a supposition perfectly consistent with our knowledge of the special and independent endowment of nervous fibres. Regarding the few cases which have been recorded, in which total destruction of the spinal marrow is said to have occurred, without in any way deranging sensibility or voluntary motion in the lower extremities,—a result equally opposed to all our anatomical, physiological, and pathological knowledge, we perfectly agree with the opinion expressed by M. Bouillaud, viz. that it is probable the observers of these cases have committed some error, either in the observation of the symptoms, or in the description of the morbid alterations. (*Dict. de Méd. et de Chir. Prat.*, art. MYELITE.) This point is discussed more fully under PARALYSIS.

Diagnosis. We have already explained how myelitis is to be distinguished from *spinal meningitis* when treating of the last-named disease, the leading symptoms in the first being paralysis and loss of sensibility, and in the latter tetanic rigidity and increased sensibility. In the advanced period of the chronic form, the disease of the cord generally becomes complicated with spinal meningitis, and there is perfect paralysis, with rigidity and contraction. Meningo-myelitis is recognised, in the acute stage, by the combination of tetanic rigidity, paralysis, and pain, with more or less fever. The progress of the symptoms distinguishes myelitis from spinal apoplexy, in which latter the effects are sudden. In some cases there is great difficulty in detecting the early stage of the chronic form of the disease from rheumatism, and occasionally it is impossible, unless paralysis is present; but if, on percussing or pressing on the spinous processes, or passing a sponge saturated with hot water down the vertebral column, increased pain is complained of in a particular part of the spine, we may conclude that there is some affection of the cord or its membranes. This method will likewise assist in distinguishing the part of the cord affected.

Prognosis. Acute myelitis generally terminates fatally, probably because the symptoms in the early inflammatory stage are confounded with rheumatism, or other affections, and are treated inefficiently. When disorganisation has taken place, we have every reason to believe the disorder to be incurable. The disease is most rapidly fatal when the lesion involves the respiratory nerves. Life is usually prolonged when the lumbar region is affected, although the observations of Calmiel have shown that, even in this case, death may occur quickly. The chronic form may be successfully combated in the early stages. MM. Öllivier and Latour (*Mém. de la Soc. Méd. d'Emul.*, tom. vi. p. 92.) have reported several cases of cure after the disease had existed several months. We have seen one case of well-marked acute meningo-myelitis recover, and another is reported by Dr. Ruse of Baltimore. (*American Medical Recorder*, July, 1825.)

Treatment. The treatment of myelitis, both in its acute and chronic forms, is exactly the same as that recommended for spinal meningitis; and we have nothing to add to what has been there stated. With regard to the value of certain remedies which have been recommended for the cure of paralysis, in the chronic form of the disease, such as strychnine, galvanism, electricity, &c. this subject is discussed in the observations on the treatment of PARALYSIS.

HYDRORACHIS.

Definition.—*Congenital hydrorachis.*—*Hydrorachis developed after birth.*—

Causes.—*Anatomical characters.*—*Nature.*—*Diagnosis.*—*Prognosis.*—

Treatment.

THIS term (from ὕδωρ, *aqua*, and ῥάχϊς, *spina*) is applied to abnormal collections of fluid within the spinal column, whether congenital or occurring after birth. Magendie has pointed out, that in the healthy state there is always a certain quantity of fluid in the subarachnoid cavity of the spinal canal, which is absorbed soon after death. Whenever, therefore, a considerable quantity of this fluid is discovered twenty-four hours after death, we may consider it morbid, and resulting from previous disease of the brain or spinal marrow. On account of the free communication between the arachnoid and subarachnoid cavities of the spinal cord and the brain, it is often difficult to determine whether hydrorachis occurs primarily from the membranes of the one or the other, but if the seat of effusion be between the dura mater and osseous covering, there can be no doubt (as observed by Abercrombie) that it is spinal only.

Congenital hydrorachis in the fœtus or new-born infant is always associated either with hydrocephalus or spina bifida. When connected with the former, all the symptoms of water in the head are present; when hydrorachis is complicated with spina bifida, there are certain local and general symptoms which indicate the affection. These we proceed to enumerate.

On examining the spine, one or more tumours containing fluid are found, situated immediately over the deficiency in the vertebra, most commonly the lumbar, this affection being seldom met with in the dorsal and sacral, and still more rarely in the cervical region. When the disease occurs in the latter situation, there is generally separation also of the cranial bones. There may be one or more distinct tumours in the cervical, dorsal, or lumbar regions, or, if the whole spine is bifid, one tumour may occupy all three regions, being proportionate in length to the number of malformed vertebræ. Feiliz gives a case in which all the spinous processes were deficient, and the tumour occupied the

whole length of the spine. (Richter, *Chir. Bibl.*, band 9. p. 185.) In magnitude it varies from the size of a hazel nut to that of an adult head, and is usually of a globular or ovoid shape, but sometimes pyriform, semilunar, or flat, with either a large base or a narrow neck. In a case by Brewerton, it was bi-lobed. (*Edin. Med. and Surg. Journ.*, July, 1820.) To the touch it is either tense or flaccid, according to the position of the infant; for as there is always a free communication between the cavity of the tumour and that of the spine, and generally with the cranium, it is more distended when the infant is in such a position as will allow the fluid to gravitate towards it. By gradual pressure, also, its bulk may be diminished, and if small, all the contents may be thus forced into the spinal or cranial cavity, stupor being often produced from the pressure on the brain. In some cases, as noticed by Cruveilhier, the tumour expands during expiration, and sinks during inspiration, but he was unable to observe movements synchronous with those of the pulse. (*Anat. Descrip.*, tom. iv. p. 564.) The coverings of the tumour may present various appearances, which have been divided by Billard into three varieties. In the first, the integuments covering the tumour are in the healthy and uninfamed state; in the second, the skin is thin and discoloured, sometimes with exudations of a sero-sanguineous fluid, indicating the approaching rupture of the parietes of the tumour; in the third variety, the tumour has burst, the effused fluid escaping through a fine ulcerated perforation, surrounded by a red, rugous, and unequal elevation of the skin. Of these, the first is the most uncommon and the least dangerous. In seven cases observed by Billard, two were born with the skin covering the tumour in the healthy state. Spina bifida sometimes coexists with other malformations, as of the urinary or genital organs; with imperforate anus; malformation in the digestive canal, &c.

The constitutional symptoms of this affection present no remarkable difference from those of other spinal diseases. Infants after birth are generally emaciated and feeble. There is more or less paralysis of the lower extremities, sometimes connected with œdema, occasional convulsions, inability to take the breast, resolution of the sphincters, difficulty of breathing, which, as the disease approaches its fatal termination, becomes stertorous. The infant becomes gradually more and more exhausted, its cries weaker, the extremities cold, the pulse excessively quick and feeble; and convulsions or coma, more frequently the former, precede death. These symptoms bear a relation to the state of the tumour, being less urgent if it is small, and if there be no opening. In the latter case, if the aperture be minute, no distressing symptoms may appear for some time, though a certain quantity of fluid is continually discharging, or may be pressed out. In this way, several pints have been removed. Very often, however, the nature of the fluid becomes altered, and from being colourless and limpid gets turbid, more or less purulent, and sometimes fetid. The exhaustion of the little patient is proportionate to the quantity and purulent character of the discharge. These effects are the result of inflammation of the meninges, which sooner or later comes on and destroys the infant. Of the seven cases observed by Billard, he found traces of spinal meningitis in five. If the tumour be large, and burst suddenly, and a large aperture afterwards form, death occurs more quickly, generally preceded by convulsions. This event has taken place in utero without having been immediately fatal. Duges has given a case where there was a large scar in the sacro-lumbar region, covering a membranous substance, by which the vertebral canal was not very firmly closed. The child perished six weeks after birth.

Hydrorachis developed after birth. Cases have been recorded by Frank and Reydellet, where tumours with an aperture in the spinal canal have occurred after birth. Such cases, however, are very rare, and when the bones of the column are perfectly formed, no tumour is produced except in the sacral region, which is naturally open. Morgagni gives a case from Genga (epist. 12. sect. 9.), of hydrocephalus following a blow on the head, in which a tumour appeared

at the coccyx. This was opened, and the head diminished in size as the fluid was evacuated. What further proved the communication between the fluid in the head and that within the tumour, was, that on pressing the cranium it escaped with impetuosity. Tumours may also be produced by acephalocysts, and the escape of fluid between the vertebral laminæ; cases of which are given by Ollivier.

Hydrorachis developed after birth is generally symptomatic of spinal congestion or meningitis, and may be associated with, or depend upon, hydrocephalus. It is characterised by pain in the back, extending a greater or less distance; paralysis of the lower extremities, with numbness or complete loss of sensibility; sometimes œdema of the legs and feet, or gangrene of the toes; paroxysms of convulsions or tremors have been occasionally observed (Bonnet. *Sepulchretum*, tom. i. p. 305. 307.); and resolution of all the limbs, involuntary stools and urine, laborious respiration becoming stertorous before death.

If hydrocephalus, as is generally the case, accompany the spinal disease, all the symptoms of the former affection are combined. Itard gives a case of hydrocephalus, in which, on ice being applied to the head, the cerebral symptoms disappeared, and complete paraplegia followed, apparently from the changed position of the effused fluid. Dr. Graves speaks of a case in which, when the patient was lying down, the lower extremities could be moved with a certain degree of force, but when the individual stood erect, he could not place one leg before the other. Ollivier attributes this to the presence of serous effusion, which, when the patient was in the latter position, pressed with greater force on the lumbar portion of the cord. When the seat of effusion is between the dura mater, and the bony walls of the vertebral column, as in cases given by Bergamaschi, Ollivier, Abercrombie, and Lallemand, the same general symptoms are present.

Causes. The causes of congenital hydrorachis have been supposed to depend remotely on constitutional disorder in the mother, as syphilis, scrofula, scurvy, or rickets; violent mental emotions, excessive venereal indulgences during pregnancy; concussions or other injuries affecting the mother, and imagined to act upon the fœtus in utero, &c. There is no proof, however, that any of these circumstances bear any relation to the presence of hydrorachis in the fœtus. The immediate causes are organic changes in the placenta or umbilical cord, producing more or less interrupted circulation and subsequent serous effusion into the spinal cord; inflammation of the membranes of the cord, or of the brain, &c. Hoffman imagined that pressure on the head during parturition sometimes squeezed the fluid into the spinal canal. (*Miscel. Nat. Cur.*, obs. 208.) In the majority of cases, however, the occurrence of hydrorachis cannot be traced to any cause. The numerous theories brought forward to explain spina bifida, it is unnecessary to discuss. The causes of hydrorachis, when developed after birth, are of course the same as those which produce the disease with which it is complicated, or on which it depends, as hydrocephalus, spinal meningitis, &c.

Anatomical characters. The characteristic appearance found after death in hydrorachis is the abnormal collection of serous fluid, the presence of which is generally associated with morbid alteration of the neighbouring tissues, such as detailed in the description of spinal meningitis and myelitis. It may, however, be the only morbid appearance present. Duges gives the case of a man who died with paraplegia, in whom no other morbid lesion could be found except an effusion of serosity in the sacro-lumbar region, that gave the dura mater the appearance of an intestine filled with water. (*Dict. de Méd. et Chir. Prat.*, art. HYDRORACHIS.) The fluid is sometimes limpid, often turbid, flocculent, or mixed with pus. In the latter case it is the result of meningitis or ulceration of the tumour. Its colour may be of a light yellow, green, or black tint, and often more or less sanguineous. The amount of the effusion differs considerably from a slight accumulation of serosity, to such a quantity as fully distends the mem-

branes, occupying the whole of the spinal canal pressing on the brain, or communicating with a fluid in the cavity of the cranium. M. Montault found 14 ounces in the first situation alone. (*Journ. Hebdom.*, August, 1833.) It may exist in three situations:—1. between the pia mater and the arachnoid membrane, the seat of the cephalo-spinal fluid of Magendie; 2. in the arachnoid cavity; and, 3. between the dura mater and bony walls of the vertebral column. When the fluid collects in the two first situations, it generally, but not always, communicates freely with the ventricles, and the arachnoid cavity within the cranium. In two instances Billard observed that the effusion into the cranium, and that into the vertebral canal, was different in colour, showing that they were perfectly distinct, and in one of these the fluid in the fourth ventricle was retained by a firm reddish membrane, which formed a cul-de-sac below its inferior angle, interrupting all communication with the subarachnoid cavity. (*Billard*, 3d edit. obs. 69.) Two other cases have been reported by M. Lediberdière. (*Arch. Gén. de Méd.*, tom. v. 2d series, p. 39.) Cruveilhier has seen a similar membrane to that described by Billard in a case of hydrocephalus, where the fluid was prevented from entering the spinal canal. (*Anat. Pathol.*, liv. xv.) In the third situation it is impossible any communication can exist with the brain, on account of the adhesion of the dura mater to the margin of the foramen magnum. It must not be forgotten that a serous fluid may be effused into the substance of the cord. In a case given by Portal there was a cavity in the cord extending to the fourth dorsal vertebra, large enough to admit a common quill, distended with serous fluid, and communicating with the ventricles. The serous cysts which are occasionally developed in the cord or membranes, if small, cannot be said to constitute hydrorachis, any more than similar cysts in the brain or its membranes constitute hydrocephalus.

In congenital hydrorachis combined with spina bifida there are deficiencies in the vertebra, which Fleischmann has divided into three classes:—the first comprehends division of the whole vertebra, body as well as processes; the second, imperfect development of the lateral arches only; and the third, development without union of the lateral arches. (*De Vitiis Congenitis, circa Thoracem et Abdomen*. Erlangæ.) The first and third of these are rarely met with. The anatomical character of the tumour also varies, its walls being sometimes natural, composed of skin, dura mater, and one layer of the arachnoid or both, according as the fluid is situated in the arachnoid or subarachnoid cavity; in other cases its parietes are more or less diseased, being inflamed, thickened, ulcerated, gangrenous, covered with fungous growths or tufts of hair. In these cases, also, the spinal cord may be more or less affected, its substance being, according to Meckel, either softened, reduced to a pulp, diminished in size, divided into two parts, or expanded into a membrane; according to the observations of Ollivier, however, these alterations are not common. The cord is often preternaturally long, owing, as Ollivier thinks, to the adhesion between it and the water of the lumbar tumour fixing it permanently at a point of the spinal canal where it ought only to have remained temporarily. More rarely the substance of the cord is entirely wanting; the membranes, according to Otto, having fallen together, and being usually slit at one or more places, or they are more or less degenerated, and adherent to each other, forming sometimes a closed sac filled with lymph. Morgagni cites cases from Tulpus, Lechel, and Alpinus, who saw the nerves floating in the aqueous tumour. (*De Sed. et Caus.*, epist. 13.) This has also been seen by Ollivier and Cruveilhier. Mr. Stafford has described the nerves as distributed on the inside of the tumour in which they terminated, and where occasionally they formed a nervous network. (*Injuries and Diseases of the Spine*, p. 21. et seq.)

Nature. The pathology of hydrorachis will always be found in perfect accordance with that of other spinal diseases, and with the facts stated in the general observations. As the palsy which accompanies hydrorachis is explained under PARALYSIS, it is unnecessary to discuss the subject here.

Diagnosis. In the congenital form, when combined with spina bifida, the

situation of the tumour, and the effects of pressure, will readily detect the nature of the disease. When at birth or at a later period it is complicated with hydrocephalus, it is distinguished by the peculiar symptoms of that disease. In these cases, however, in addition to the cerebral symptoms, those denoting lesion of the spinal cord, as convulsions, paralysis of the extremities, rectum, and bladder, are more marked. When it is the result of spinal meningitis, myelitis, or meningo-myelitis, the peculiar symptoms of those maladies are observed. We are not aware of any symptom which may be considered as diagnostic of hydrorachis in an idiopathic form, unless the circumstance noticed by Dr. Graves, formerly alluded to, may be so considered. We have seen two cases of incomplete paraplegia, in which the patients could move the inferior extremities much more readily in bed than when supported in the erect position. As these individuals are still living, it is impossible to say whether this depends upon the gravitation of fluid in the spinal canal; very little attention has hitherto been paid to this point.

Prognosis. The prognosis in hydrorachis must always be very unfavourable. In the congenital form, when connected with spina bifida, it is not necessarily fatal, many cases having been recorded that existed several years, and in these death was apparently unconnected with this affection. Individuals have been found in whom this disease was complicated with spina bifida, — by Bonn at 10 years; by Martini at 11 years; Paletta and Acrel at 17 years; by Henderson at 18 years; by Copland at 19 years; by Warner, Hochstetter, and S. Cooper at 21 years; by Camper at 28 years; by Cowper at 30 years; and Ollivier cites a case by Swagermann, who saw it in an individual 50 years old. (*Ollivier*, vol. i. p. 227. 3d edit.) Generally speaking, however, the larger the size of the tumour, and the greater the destruction of the cord or brain, the greater is the danger, and this is increased when there is sloughing or gangrene. When the tumour bursts, the patient generally dies quickly in convulsions. Ollivier says, that once only in such a case a cure has followed. The death takes place more rapidly if the laceration in the tumour be large, or inflammation attacks its walls. When other malformations are combined with the disease, it is unnecessary to say the case is more hopeless.

Treatment. The treatment of congenital hydrorachis with spina bifida may be considered as radical or palliative.

The radical treatment is very hazardous, and in the majority of cases has hastened the fatal result. Sir A. Cooper has cured two cases by repeated small punctures, Probart another (*Lancet*, No. 186.), and Rosette and MM. Robert one each. (*Arch. Gén. de Méd.*, tom. xvii. p. 280. and tom. xviii. p. 102.) In the two last cases the inferior extremities were completely paralysed, proving that this circumstance does not contra-indicate the performance of the operation. Experience has shown that the sudden bursting of the tumour almost always produces death, by occasioning spinal meningitis; and consequently, whenever it presents an inflamed appearance at any point, and is apparently about to break, a puncture should be made with a small cataract knife, at the most depending part of the tumour, and the fluid gently squeezed out. Before the pressure is removed, the orifice should be covered with a piece of adhesive plaster, in order to favour union by the first intention, and a bandage applied so as to occasion gentle pressure, and support the walls of the tumour. After a time this may be repeated if necessary, and the treatment conducted nearly on the principles recommended by Mr. Abernethy for psoas abscess. All other radical methods of cure, such as the ligature, setons, &c. are incompatible and dangerous.

Except under the circumstances we have alluded to, the palliative treatment should always be employed. Compression was proposed by Mr. Abernethy, with a view of supplying the deficiency in the spinal canal, and giving support to the part. Sir A. Cooper applied a plaster of Paris mould to the tumour, to effect this. In whatever manner pressure is applied, care must always be taken that it is gradual, for if it be sudden, or carried too far, convulsions or

paralysis will be the consequence. Although this practice is undoubtedly useful, it may be questioned whether the local application be the principal means of cure. Most probably the improvement in the general health, by strengthening the system, increasing the activity of the circulation, and thus preventing local congestion, which tends to keep up or increase the amount of serous effusion, must be the chief indication of treatment in this disease. While, therefore, gentle pressure on the tumour, either by bandages, plaster of Paris, or a discutient plaster, is employed, great pains should be taken to increase the general tone of the system, and apply such remedies as will induce absorption of the fluid, and prevent its tendency to increase. With this view, change of air to a dry situation in the country ought to be recommended, and a healthy wet nurse employed. Small doses of the Hydrarg. c. Cretâ, or one or two grains of calomel, according to the age of the child, should be given every other morning for two or three weeks. The preparations of iodine may also be administered with a view of procuring absorption, or the nurse may undergo a course of this medicine. Small blisters applied above the tumour, in the course of the spine, so as to cause a rubefacient effect only, may be employed frequently. Extreme caution, however, is necessary, that vesication is not produced, as in infants, particularly those of a weak constitution, sloughing and further exhaustion may be occasioned. Great attention must be paid to the regularity of the alvine discharges, and gentle aperients given to insure this if necessary. The child should be warmly clothed, and carried out frequently in the open air when the weather is fine.

When hydrorachis is associated with hydrocephalus, or with congestion, or inflammation of the spinal cord or its membranes, the treatment recommended for those affections should be employed. The same measures are to be employed when the disease is developed after birth, the remedies having reference to the age of the patient and the stage of the disease.

SPINAL APOPLEXY.

Symptoms. — Causes. — Anatomical characters. — Nature. — Diagnosis. — Prognosis. — Treatment.

ALTHOUGH there are some doubts as to the propriety of applying the word apoplexy to hæmorrhage into any tissue, its general use has induced us to adopt it to express the spontaneous extravasation of blood into the spinal canal, either between the membranes or into the substance of the cord.

Symptoms. We have noticed, when speaking of cerebral apoplexy, the symptoms denoting hæmorrhage into the cranial portion of the cord. But spontaneous effusion of blood into the cervical, dorsal, or lumbar portions is an occurrence of extreme rarity, and its history is consequently very defective. We have every reason to suppose, however, that hæmorrhage will give rise to the same effects as destruction of these parts by accident or disease, and that they will be more sudden and well-marked, according to the violence and the extent of the effusion. The cases recorded by Abercrombie, Chevalier, Stroud, Cruveilhier, Monod, Grisolle, Gaultier de Chaubry, and others, show that the attack is always characterised by acute and sudden pain in the back, corresponding with the seat of effusion. Sometimes there are precursory symptoms of shivering, and slight dorsal pains, which have been mistaken for rheumatism. In some instances there is sudden paralysis in one or more of the extremities below the seat of pain; in others the paralysis comes on gradually, and is preceded by pain in the portion of the spine corresponding with the supposed seat

of the hæmorrhage. The other symptoms which have been observed are similar to those we have noticed when treating of myelitis affecting the cervical, dorsal, or lumbar portion of the cord. Eschars are often formed on the sacrum before death; the sphincters are paralysed, and the respiration becomes gradually more and more laborious: in the case of M. Grisolles there was nausea with sense of suffocation, and in that of M. Cruveilhier vomiting of black blood, before the fatal termination. In the case of M. Monod pus and blood were mingled with the urine, and in that of Abercrombie there was tetanic rigidity and convulsion. In this last case, however, the spinal marrow was not changed in structure, the hæmorrhage having occurred between the dura mater and bones. There is in general no fever, the pulse is not affected, and the intelligence remains perfect to the last.

Causes. Effusion of blood into the spinal canal may result from blows, falls, contusions, fractures, and other kinds of direct violence. Spontaneous apoplexy of the cord has been observed to follow when the individual has remained some time in the sitting posture, from lifting a heavy weight, and as a consequence of rheumatism, cerebral apoplexy, and myelitis.

Anatomical characters. The hæmorrhage in spinal apoplexy appears to be occasioned by the same causes that produce it in the brain. It may form circumscribed extravasations in the substance of the cord, as in cases recorded by Hutin, Cruveilhier, and Stroud. In such circumstances a cyst forms, and the blood effused undergoes exactly the same changes we have described in cerebral apoplexy. In some instances it is combined with softening (Gaultier and Grisolles), when the nervous substance is more or less broken up and mixed with the extravasation. The grey matter appears most liable to this alteration. Hæmorrhage may also occur in the subarachnoid or arachnoid cavity, or between the dura mater and bony walls of the canal, as in the case given by Dr. Abercrombie. The effusion may be referred to hæmorrhage occurring in the brain, which is forced into the spinal canal, or to rupture of some blood-vessel in the adjacent structures, to which only, in the latter case, it can be attributed.

Nature. The pathology is perfectly consistent with the known functions of the spinal cord. The amount and seat of the paralysis is attributable to the degree of pressure or disorganisation occasioned, and the portion more immediately affected. The study of the recorded cases also shows that the changes after the attack are proportionate to the alterations occurring in the extravasation. The occurrence of convulsions in Dr. Abercrombie's case, in which the effusion was exterior to the dura mater, thus occasioning partial pressure, illustrates well the influence of this cause in producing excited action. This symptom has not been observed, when the extravasation has affected the substance of the cord directly. In Dr. Stroud's case, circumscribed effusion of blood took place on the left side of the cord, producing first hemiplegia of the same side of the body, and afterwards paraplegia. (*Bright's Reports*, vol. ii. p. 339.)

Diagnosis. The diagnosis of this disease is very obscure, as our observation of it is as yet insufficient to enable us to indicate its peculiarities; the premonitory symptoms, however, have been confounded with rheumatism, from which it can only be distinguished by the progress of the case. In general, the sudden and acute pain distinguishes it from other spinal affections, and when the spinal marrow is the seat of the hæmorrhage, there is no convulsion or tetanus.

Prognosis. The case of Cruveilhier, in which the patient lived five years after the first attack, proves that this disease is not always speedily fatal. In the majority of cases, however, the greatest danger is to be apprehended.

Treatment. In the treatment of spinal apoplexy, absolute rest, in order to prevent any recurrence of the extravasation, and to favour the absorption of effused blood, is the chief element. Bleeding should be employed if there be no signs of prostration, but not to any great extent, as the symptoms do not indicate active vascular excitement. The diet should be low, and great at-

tention paid to the alvine evacuations, which are to be regulated by injections, active purgatives being as much as possible avoided. The state of the urinary bladder should be inquired into daily, and, if necessary, the urine drawn off by the catheter. Counter-irritants are obviously useless. Care should be taken to prevent the eschars, which are likely to form on the sacrum and back, by placing the patient on the hydrostatic bed, or by adjusting cushions and air-pillows so as to prevent long-continued pressure on any part.

CHOREA.

Characteristic symptoms. — Analogous affections. — Anatomical characters. — Nature. — Causes. — Diagnosis. — Prognosis. — Treatment.

THE disease to which the name of Chorea is most commonly applied, and to which it was first restricted by Chaussier, is characterised by incomplete subserviency of the muscles of voluntary motion to the will, rendering their actions irregular, tremulous, and often ludicrous. It occurs most frequently in the female sex, and in general between the ages of eight and fifteen. The designations, "St. Vitus's dance and dance of St. Guy," became popular in consequence of the practice which formerly prevailed among the subjects of similar affections, to repair annually to a chapel at Ulm in Swabia dedicated to the saint, called by the Germans St. Weit, and by the French St. Guy; who, having suffered from the complaint in his lifetime, was supposed to be rewarded with the power of curing it after his death. It is probable that, from the influence of sympathy, a temporary aggravation of the complaint was produced in so large an assemblage of subjects, but it is said that they afterwards remained for a year free from the malady.

In chorea the muscular disorder may either be general, affecting the extremities, trunk, and face, or partial and confined to the face or neck, or to one extremity. It occurs for the most part in persons of a weak constitution, either natural or acquired, and is commonly preceded by derangement of the organic functions, indicated by variable appetite, tumid abdomen, constipated bowels, and impaired vivacity. The convulsive motions are preceded by slight irregular twitchings of the muscles of the face, which may easily be mistaken for voluntary grimaces. In the progress of the complaint the irregular action becomes more intense, and implicates a greater number of muscles; those of the extremities, of the lower jaw, or of the head and trunk, being at different times affected. The patient does not walk steadily, but moves irregularly from side to side, or proceeds by jumps or starts; one foot is rather dragged than lifted, and the movements of the arms resemble the gesticulations of players. As the complaint increases, the patient seems as if palsied, and becomes unable to walk or to perform the necessary movements of the arms. In extreme cases deglutition is difficult, and articulation interrupted, so as to produce stuttering; the mouth is distorted, and saliva drivels from it. Different muscles may be successively convulsed, but those first affected usually continue involved throughout the whole course of the disorder.

In severe cases the irregular actions are never suspended excepting during sleep, and may even continue irrespective of this condition. They may be continuous, intermittent, or remittent; and are increased by observation, contradiction, or any irritating cause, and especially by any attempt forcibly to restrain them. The eye loses its lustre and intelligence. The liability to causeless emotions, and the disposition to concealment characteristic of hysteria, are often present; the mind becomes capricious and irritable, and there is a ten-

dency to take alarm or to weep at the slightest cause. The disease when long protracted may induce fatuity, epilepsy, or hemiplegia, or may terminate in marasmus.

Chorea in the female is frequently associated with deranged uterine function, sometimes with chlorosis, but perhaps more frequently with amenorrhœa. Hysterical symptoms are in general superadded when the disease occurs about the time of puberty. At this period chorea may be superseded by hysteria, which at a later period may in turn give place to neuralgia, the susceptibility to these diseases seeming to depend on a similar condition of the nervous system, modified by different periods of life. Serous effusions, especially into the arachnoid and pericardium, sometimes attend protracted cases. The complication with rheumatic affections of the muscles, pericardium, and spine, has been well elucidated by Dr. Copland, as well as by Drs. Prichard, Roeser, and Bright.

Various cutaneous eruptions, of which urticaria and roseola are the most frequent, may be associated with chorea; but since the irregular movements may either precede, attend, or follow the eruption, we must consider the phenomena, not as in the relation of cause and effect, but rather as results of the same state of the nervous centre. It is however probable, that the eruptive condition tends to moderate the spasmodic disorder.

In the disorder to which we now limit the name of chorea, the will is properly exerted, but is only partially efficient. The analogous affections to which the term has been occasionally applied, consist chiefly in energetic and often measured actions of the muscles, under the influence of a morbidly excited will. Such appears to be the nature of the original chorea of the Germans, of *Tarantism*, and of *Leaping ague*. Sometimes however the muscular disturbance seems independent of the will, and unassociated with consciousness, and differs from convulsion only in the orderly nature of the motions. Cases of rotation of the whole or part of the body, of malleation, and of irresistible propulsion forwards or backwards, belong to this class. The phenomena which have occasionally occurred under the excitement of religious enthusiasm, although in the first instance resulting from mental impressions, often become involuntary in their progress.

I. In the first class of analogous affections we may specify the following examples:—

1. The original chorea consisting of inordinate and almost supernatural muscular exertions, depending on a mental impulse, and excited by imitation or by music, the measure of which seemed to regulate the movement. Felix Platerus mentions a woman of Basil who danced for a month; and it appears from the accounts of Horstius and others, that the complaint was apt to recur annually, and that those affected would continue dancing, when under the influence of music, for an incredibly long period, until at length exhausted by their exertions. (*De Mentis Alien.*, vol. i. p. 15.) Later writers have referred to the affection under the names of *Epilepsia saltatoria* and *Morbus saltatorius*. The first distinctly recorded manifestation of such a malady occurred, A. D. 1027, near Bernberg, on St. John's Day; a festival during which it was customary, perhaps in imitation of Bacchanalian rites, to kindle the *nodfjyr*, and to dance around or through it with various frantic gestures. There is reason to believe that these performances sometimes gave origin to the disorder in question. For several centuries after this period the affection was occasionally witnessed. The excitement produced by destructive epidemics and other calamities, and the superstitious ceremonies of Popery, probably contributed to its prevalence. In St. John's dance, as well as in that of St. Vitus, and in the affection next to be described, a tympanic state of abdomen was a frequent symptom.

2. *Tarantism* (sometimes designated *Tarantulismus*, *Chorea Sancti Valentini*, *Choreomania*, *Dæmonomania*, *Melancholia saltans*, &c.) in every important particular resembling the affection last described. A few hours after

being bitten by the poisonous spider called Tarantula, the patients fell down senseless and motionless, with difficult respiration and heavy sighing. As these symptoms subsided, they appeared desponding and melancholy, frequented churchyards and solitary places, evinced a capricious fancy for particular colours, and sometimes appeared to have an irresistible propensity to roll themselves in the dirt. At the sound of suitable music they began to move first the fingers, then the hands, feet, and successively other parts of the body, and then sighing and dancing threw themselves into every variety of violent and fantastic gesture. Sauvages says, "Those who are stung die in a little time without the present assistance of music, all other remedies giving no relief." Those affected were capricious as to tune, and required the notes to be run over with the greatest quickness. This quickness of sound, called tarantella, afforded a test for the detection of those who feigned the disease, a practice, according to Baglivi, common among the women of Apulia, when they wished to be indulged in music and dancing. If they were satisfied with slow musical movements the deception was at once discovered. An instance of convulsive disorder resembling tarantism, produced by the bite of a spider, and cured by music, is related in the *New York Medical Repository*.

3. The *Leaping ague* of the Scotch writers, characterised by increased efficiency, but depraved direction of the will, producing an irresistible propensity to dance, tumble, and run about in a fantastic manner, often with far more than the natural vigour, activity, and precision. The subjects of the malady, after some pain of the head and lower part of the back, become affected with bodily distortion. They leap in a remarkable manner, climbing or springing from the floors to the rafters of cottages, and swinging by or whirling around them. This state is often accompanied with a disposition to secrete any thing within their reach.

In the *Edinburgh Medical and Surgical Journal* there is an account of a girl affected with this complaint, who also exhibited a remarkable inclination to commence sentences with the last word, and often to put the last letter of a word foremost. In writing she would proceed from right to left, placing the last word and the last letter first; often with great rapidity, and apparently without consideration. In the treatment of this case purgatives proved useless; opiates sometimes prevented a paroxysm, but did not permanently relieve. Locked jaw of eight days' duration followed the use of a shower bath, and the symptoms did not return. Some cases of periodical jumping and shrieking, related by Armstrong, following pertussis, and considered epileptic, probably belonged to the same class of affections.

At the close of the seventeenth century, a case in some respects resembling those above described occurred at Edinburgh, and an account of it was published with the title, *A True Narrative of the Sufferings of a Young Girl, who was strangely molested by Evil Spirits and their Instruments*. A commission from the king was appointed to inquire into it, and seven persons were in consequence committed to the flames for witchcraft. (*Edin. Med. Com.*, vol. ix.)

II. The second class includes those analogous affections in which the movements are systematic, but involuntary; viz. malleation, rotation, and propulsion in various directions.

1. The affection to which the term *Malleatio* has been applied, examples of which have been described by Morgagni, Dr. Crawford, and other writers, consists in an apparently irresistible disposition to beat the knees with the hands as with a hammer. The action is regular but involuntary, and occurs in paroxysms.

2. Instances have occasionally occurred of involuntary rotatory motion of the whole or part of the body. For example, rotation of the head has been observed by Drs. Conolly and Crawford, and Mr. Hunter has related a case in which rotation of the head and trunk occurred, and was relieved by the application of tartar emetic ointment to the scalp and spine. Under the name of chorea Dr. Watt has related the case of a girl ten years of age, who, after

suffering from vomiting and excruciating headach, evinced a singular propensity to turn round on her feet like a spinning-top. On the subsidence of the affection (in about a month), the headach was aggravated, and the muscles of the neck were partially paralysed. After this, paroxysms occurred daily, in which she placed herself across the bed, and rolled rapidly on her side, from one end to the other. About sixty rotations were accomplished in a minute. They were not checked by the affusion of cold water; indeed, when placed in the shallow bed of a river, the girl kept up the motion, although at the risk of being drowned. In about five weeks a different movement was substituted, namely, that of approximating the head and heels, raising the trunk, and then falling forcibly on the back. These motions continued to characterise the affection for five weeks, when they were succeeded by a propensity to stand on the head, to raise the feet perpendicularly, and then fall as if dead; these evolutions were performed more than twelve times a minute for fifteen hours daily. The malady did not yield to blisters, setons, local depletion, emetics, and cathartics, which were successively employed, but disappeared after a spontaneous diarrhœa.

3. Propulsion, either forwards, backwards, or in zigzags, has occasionally occurred. M. Piedagnel has given an instance of a man who sometimes went out and walked forwards till he was exhausted and obliged to be carried home in a litter (*Magendie's Physiology*, by Milligen, p. 189.); and Dr. Laurent of Versailles has related a counterpart to this case, in a girl irresistibly propelled backwards with such violence, as to sustain considerable injury. Drs. Dufour and Rennes (*Arch. Gén.; Lond. Med. and Surg. Journ.*, June, 1832) have related examples of zigzag movements occurring in persons addicted to intoxication, who had previously suffered from bronchitis. The phenomena were at first mistaken for those of drunkenness, but yielded to the use of opium.

Mr. Kinder Wood has recorded a most interesting example, in which the phenomena of the original chorea were associated with malleation, rotation, propulsion, and leaping ague. It occurred in a woman whose nervous susceptibility was probably increased by prolonging lactation for fourteen months, the catamenia having appeared during the latter three months. At first she suffered from pains of the face, which were relieved by a liniment of opium and ammonia; twinklings of the eye, motions of the legs, and rotation of the arms, succeeded. The palms of the hands were beat upon the thighs, and the feet upon the ground; the backs of the wrists were struck frequently against each other; at other times the middle fingers being extended inwards, struck the palm of the opposite hand, and so alternately with almost inconceivable quickness. The affection of the eyelids was usually succeeded by headach of short duration, with sickness and vomiting. On some occasions she would move up and down, or from side to side on her chair, and then springing on her feet, leap and jump, or be propelled forwards. Sometimes she would go into every corner of the room, striking the furniture. She would frequently dance on one leg, holding the other in the hand. In the course of the complaint it was observed, that the blows on the furniture were in musical time, and the involuntary actions, as they were considered, changed to a measured step. Although ordinarily an inexperienced dancer, she would on these occasions move about elegantly as in a minuet. It was ascertained that there was always a tune in her mind impelling her to the movements. When this tune was performed on the drum, she ran up to the instrument and danced with great activity and apparent delight, but the movements were always stopped by rolling the drum. Although yielding, as it seemed, unavoidably to the desire of dancing, she always wished for the rolling of the drum, that the muscular excitement might be checked; for, till a new impression was made by a change of measure, the morbid desire prevailed over the rational will. As occurs in tarantism, the motions always commenced in the fingers and then extended to other parts of the body, and became more frequent as their duration lessened. On the day the motions ceased, diffused patches of a bright

red eruption came out near the elbows, and continued for three days. The catamenia afterwards appeared, and health seemed established. In five weeks, however, the muscular movements recurred, and the eruption appeared on the arms. This attack lasted about ten days. Five weeks afterwards the affection returned for the third time, but assumed a more spasmodic character; when laid down the patient turned involuntarily on her back, and the muscles of the neck were so affected, as to force back the head and occasion dyspnoea. On this occasion no relief was obtained from music, but a cure was effected by bleeding. The previous attacks had been treated with aperients, tonics, and anodynes; and it is worthy of notice, that in each instance the most decided improvement succeeded the use of calomel and jalap. The catamenial function was suspended at the time of the malady, but had been previously regular.

III. The convulsive disorder which has sometimes occurred in religious assemblies, and has occasionally prevailed as an epidemic, is usually accompanied with shouting, singing, dancing, laughing, and coughing, with irregular exacerbations and remissions. During a remission, shaking hands with, or even looking at a person affected with the complaint, will excite a paroxysm. The seizure is at first violent and convulsive, and continues even on lying down, but after a time becomes chronic, and more closely resembles chorea.

The phenomena have been well-described by Dr. Robertson, as they occurred among a sect of enthusiasts in Tennessee and Kentucky, in the year 1800. (*Inaug. Essay on Chorea St. Viti*, 1805.) A similar affection occurred in a congregation at Cambuslang, in the year 1742. The movements, which were at first voluntary, became spasmodic, the muscles of the neck and upper extremities were convulsed, and the sufferers were thrown down and agitated with motions like those of a live fish upon land.

Anatomical characters. The opinions of authors regarding the morbid anatomy of chorea are extremely various, and the descriptions of occasional appearances serve chiefly to prove that there is not necessarily any structural change. Dr. Clutterbuck considers the disease dependent on inflammation of the brain; Drs. Coxé and Patterson on turgescence of its vessels with tendency to hydrocephalus. Roeser and Willan have found serum in the ventricles. Monod refers the malady to hypertrophy and injection of the brain and spinal cord; Hutin to hypertrophy and hardening of the anterior part of the spinal cord. Changes in the membranes of this part, such as the effusion of turbid serum or lymph, or the formation of bony plates, have been described as occasional phenomena by Drs. Copland, Prichard, Aliprandi, and Bright; and ecchymosis of the membranes, with a pulpy state of the medulla spinalis, was detected in a case related by Dr. Keir of Moscow. (*Edin. Med. and Surg. Journ.*, No. cxxii. p. 93.)

Dr. Serres having found, in one case, a tumour pressing on the corpora quadrigemina, in two instances inflammation of these parts, and in another example sanguineous effusion, is disposed to refer the disease to a morbid condition of these organs. Dr. Brown discovered a concretion in the medullary substance of the left hemisphere of the brain. In Dr. Hawkins's case there was increased vascularity of the uterus, with concretions in the pancreas, omentum, and mesentery. Dugès, Ollivier, Ruzé, Gherard, Hache, Rostan, Lawrence, and many other pathologists, have however searched in vain for any morbid changes which could be regarded as necessarily connected with the disease; and it is evident that many of the appearances above described must be considered simple coincidences; whilst others, as Drs. Patterson and Percival have observed in reference to hydrocephalus, must be viewed rather as effects than causes of the complaint. Since the scalpel fails to reveal the seat of the malady, we must have recourse to the light which physiological investigations may throw on the inquiry. There is considerable evidence in favour of the opinion, that the stimulus of the will passes from the brain through the spinal cord to the voluntary muscles; and the conclusion which Magendie has

deduced from his experiments, namely, that the will passes through the hemispheres of the cerebrum, and that the direct cause of motion is in the medulla spinalis, is at least plausible. The disturbance of harmony between the part which supplies and that which conveys the stimulus of the will to the muscles, must be sufficient to produce the irregular movements of chorea; and this harmony may probably be interrupted by derangement, whether structural or functional, of any part intervening between the cerebral hemispheres and the portion of the spinal cord from which the nerves of the affected muscles proceed. The frequency with which, in extreme cases, change of structure of the cerebro-spinal axis has been observed, is favourable to this view, since long-continued functional derangement, although it does not necessarily occasion organic change, will frequently produce that result.

There is direct experiment in support of this explanation of the cases of propulsion forwards and backwards, and of rotation, which have been above described as in some respects analogous to chorea. Magendie found, that when the corpora striata were removed, the animals operated on darted irresistibly forward; and that, when injury was inflicted on the cerebellum or medulla oblongata, they receded. (*Op. cit.*, p. 187—202.) The experiments of Serres, Flourens, and Rolando, are favourable to the same conclusion. When the peduncles of the cerebellum were divided, rotation took place towards the side cut; and vertical sections of the cerebellum, or pons varolii, produced the same effect, which was always most decided in proportion as the injury was near to the peduncle, the movement being to the right or left, according as the incision was right or left of the mesial line. Lesions of the medulla oblongata, where it approaches the external part of the anterior pyramid, occasioned a rotatory movement; but on cutting through the spinal cord behind the occipital bone, the motions became involuntary and irregular. In connection with these inquiries it may be interesting to mention, that effusion, into the ventricles, pressing upon the corpora striata, has been constantly found in horses affected with inability to go back.

The physiology of the nervous system is not sufficiently advanced to enable us to fix the locality of its individual functions; allowing their full weight to the experiments and observations which have been referred to, we are not authorised, with Serres, to limit the seat of chorea to the corpora quadrigemina or striata, or with Bouillaud and Magendie to the cerebellum.

Cases of rotation may probably depend on derangement affecting the pons varolii, medulla oblongata, or the peduncles of the cerebellum; propulsion forwards on an altered state of the corpora striata, and backwards on morbid condition of the cerebellum: but the correct exercise, yet inefficient power, of will, which characterises true chorea, seems rather to indicate an affection either of the spinal cord, or of some part closely approximating to it. Tarentism and the chorea of the Germans may probably consist with integrity of function of these parts. The muscles in those affections accurately obey the stimulus of the will which exists in excess, possibly from excitement of some part of the sensorium, more directly connected with the mind. Perhaps individual faculties of the mind, inasmuch as they are associated with material structure, may possess a power of stimulating to action analogous to will; and which, in contradistinction to the rational will, may be termed instinctive.

The morbid excitement of this power rendering it uncontrollable by the judgment, may occasion some of the irresistible actions present in affections analogous to chorea, and may also produce some of the phenomena of monomania, to which, indeed, these maladies seem closely allied.

Nature. Galen and Mead considered the disease a modification of palsy; Sydenham regarded it as a convulsive disorder, occasioned by a humour affecting the nerves; Baumes and Pinel attributed it to a combination of convulsion and palsy; Sauvages, Cullen, and many others, have referred it to a state of general debility, and consequent mobility of the system; others, among whom Drs. Parr and Hamilton may be particularly mentioned, consider that

the derangement of the muscular actions arises from sympathy with disorder of the digestive functions.

Chorea may doubtless occasionally arise from a morbid condition of the cerebro-spinal axis or its membranes, sometimes induced by the excitement of mental impressions or moral emotions; but the peculiar irritation of the nervous system essential to the malady, seems to be generally associated with, and probably dependent upon, disorder of the organic functions, which acting on a susceptible nervous system by means of the ganglionic nerves, may sympathetically interrupt the functions of those parts which convey to the muscles the stimulus of the will.

Causes. When derangement of the bowels occurs in young subjects of susceptible nervous system, almost any powerful impression, either on the mind or the body, may be sufficient to excite the disease. Among mental causes, jealousy, envy, anger, disappointment, anxiety, and excited imagination, may be mentioned, but fright is generally allowed to be the most frequent. A majority of the cases related by Dr. Reeves, Mr. Bedingfield, Dr. Bright, and others, are referrible to this cause; and its influence in producing chorea cannot be denied, notwithstanding the contrary opinion of Guersent, who argues, that the liability to be easily alarmed is a characteristic of the morbid condition, rather than the cause, of the malady. The disease is occasionally induced by the irritation accompanying the second dentition. Mechanical injuries (*Med. Chir. Rev.*, vol. ii. p. 569.), especially of the head (*Edin. Med. and Surg. Journ.*, vol. ix. p. 123.; *Med. and Phys. Journ.*, vol. xv. p. 127.), and through the orbit (*Phil. Trans.*, vol. liii.), suppressed eruptions, the healing of ulcers, extension of rheumatism to the spinal membranes, worms and intestinal accumulations, and the influence of fever or other previous disease, are among the causes enumerated by authors of repute. Dr. Marshall has detailed a case resembling chorea, apparently produced by lightning. The symptoms were much aggravated by pressure at certain points of the spine. The example is of peculiar interest in connection with the evidence adduced in Dr. Marshall's work, of the occasional production of softening of the spinal cord by lightning. It also serves to illustrate some milder examples of the disease, which were relieved by treatment applied to the spine.

All the causes of constitutional debility, whether hereditary or acquired, are favourable to the production of chorea; but premature excitement, either of the intellectual faculties or moral feelings, sedentary employments, innutritious diet, and impure air, may be especially mentioned. Females are much more liable to the affection than males. The proportion in Dr. Reeves's cases was 57 to 27; in Dr. Manson's, 53 to 19; in those of M. Rufz, 138 to 51: from these statements, and from the recorded experience of Heberden, Frank, Elliotson, and Copland, the liability of the sexes may be calculated as in the proportion of 3 to 1. The time of life in which the disease is most common is from the period of second dentition to puberty; but instances have occurred as early as the fifth year, and the disease has been known to exist from infancy. No age, however, seems to be absolutely exempt, Dr. Copland having witnessed the disorder in a man above fifty years of age, Dr. Powell in a woman *æt.* seventy, after epilepsy, and M. Bouteille associated with hemiplegia in a woman, *æt.* eighty. The complaint appears to be little influenced by atmospheric changes; but Rufz, Dugès, Blache, and Spangenburg, consider it most common in summer. There is reason to believe that it is very rare in the southern hemisphere, M. Rochoux not having witnessed any example in Guadaloupe, Chervin in the Antilles, nor Danste in the course of thirty years' practice in Martinique. Imitation has little influence in the production of the disorder. In the *Hôpital des Enfants*, Blache never witnessed its production by this cause.

Diagnosis. The characteristic partial dependence of the irregular muscular motions on the will, is sufficient to distinguish chorea from most other disorders. In convulsions, whether epileptic or hysterical, the movements are

more violent, and are entirely independent of the will. In paralysis agitans, a disease for the most part of later life, the agitation is more constant, more limited, and is devoid of ludicrous character. The tremor produced by mercury has a greater resemblance to chorea, but is accompanied with a peculiar quick catching. In cases combining the phenomena of chorea and hysteria, attention to the history and attendant circumstances will enable us to analyze the symptoms as far as is essential for practical purposes.

The *prognosis* is generally favourable, chorea being scarcely ever fatal, and becoming dangerous only when associated with, or merging in, any more formidable disease, such as epilepsy, dropsical effusion into the serous cavities, paralysis, or change of structure of the brain or spinal cord. Dr. Elliotson observes, that when the disorder is confined to the muscles of one arm or of the head, and especially when occurring in the adult, he has never seen it cured. Since the susceptibility of the nervous system is less in the adult than in the child, the probability of the existence of important organic lesion is greater when the disease occurs in advanced life, especially if the limited nature of the malady implies a local seat.

Treatment. Cases which are not very severe, frequently yield to almost any plan which, without impairing the strength, produces a decided effect on the system. Hence it is easy to explain the diversity of remedies recommended by different practitioners; Dr. Bardsley senior mentions, that in the Manchester Infirmary, notwithstanding the variety of treatment adopted by successive practitioners, an incurable case had not presented itself in the course of thirty-three years. Still the duration of the complaint, and the facility with which it is remedied, will often in a great degree depend on the judicious adaptation of treatment. A case, for example, may be cured in two or three weeks by suitable treatment, which, under less appropriate management, would be protracted for several months.

The general abstraction of blood has been adopted by those who considered the disease congestive or inflammatory, and has been sanctioned chiefly by M. Bouteille, Lisfranc, and Dr. Clutterbuck, who repeats the bleeding at intervals of a few days. Serres, considering the disease to depend on congestion or some other morbid state of the corpora quadrigemina, applied leeches and counter-irritation to the upper part of the spine. Dr. Watt speaks favourably of bleeding, but Cullen and Armstrong found it frequently injurious.

The purgative plan has been adopted chiefly by Whytt, Hamilton, Cheyne, Guersent, and Chapman, and by a large proportion of the most successful practitioners. Dr. Hamilton generally cured the disease by these means alone in ten days or a fortnight. The purgatives which have been most employed are aloes, senna, calomel, scammony, and jalap, but probably sufficient discrimination has not always been exercised in the selection of the individual remedy.

Of the vegetable tonics employed in the treatment of this complaint may be mentioned cinchona bark, as particularly recommended by Cullen, Mahon, and Werlhoff; the flowers of the cardamine pratensis by Sir George Baker and Michaelis; the powder infusion or decoction of Seville orange-tree leaves by Haen and Engelhard.

Among the metallic tonics may be enumerated, the oxide of zinc, which was considered a specific by Mr. Bedingfield, and is favourably noticed by Dr. Crawford: many of the German authors commend its powers, but Stoll has not observed any advantage from its use. The sulphate of zinc is much employed by Dr. Bright, and is preferred to the oxide by Dr. Copland. The latter author confirms the statement of Dr. Odier of Geneva, that the addition of two grains of ammoniuret of copper to each dose of the oxide of zinc, prevents that remedy from irritating the stomach. The nitrate of silver, which was recommended by Frank, Uwins, and Crampton. Fowler's arsenical solution, in doses of three minims, gradually increased to ten, three times a day, has been advantageously employed by Mr. Martin and Dr. Gregory. But the use of arsenic is sometimes productive of injurious effects, an ob-

jection which applies also to sulphate of copper and nitrate of silver. Of all tonics iron is perhaps the safest and most efficacious. Dr. Elliotson's experience leads him to confide in the remedy without the previous use of purgatives. He prefers the sesquioxide in doses of from half a drachm to half an ounce, but sometimes administers from one to four grains of the sulphate.

Cold-plunging was the method constantly employed by Dupuytren; his plan was to immerse the patient suddenly five times in twenty minutes: this treatment continued for a fortnight, or at most a month, generally cured. Dr. Hamilton was accustomed to adopt this measure previous to his employment of the purgative plan; but attributes bad consequences to its use. It is difficult to suppose that a disease, associated with so much organic derangement, could be removed by the shock of the cold bath without the risk of superinducing some other malady. The use of cold affusion or the shower bath, the patient standing in warm water, is not liable to the same objection.

Extract of belladonna in doses of a sixth to a quarter of a grain was administered by Stoll, who at the same time employed an antispasmodic liniment with great advantage. Valerian is recommended by Bouteille and Guersent, assafetida by Bayle and Jadelot, musk by Bardsley, and a combination of camphor and extract of henbane by Dr. Bright.

Among internal counter-irritants may be specified spirits of turpentine, first prescribed in this disease by Dr. Copland, a solution of tartar emetic by Ferran, large doses of the same remedy (from four to eight grains) by Breschet, and emetics by Laennec. External counter-irritants, such as blisters, setons, and issues, have been employed by many practitioners, and by others tartar emetic ointments, or plasters to the scalp and spine; and Chrestien advises aromatic embrocations.

Galvanism, recommended by Meyreaux, and electricity, first introduced as a remedy by De Haen, appear to act as counter-irritants. The application of electricity often produces an eruption of the nature of lichen urticatus. This agent seems especially efficacious in cases associated with defective catamenial secretion, and has been lately employed by Dr. Addison with considerable success.

The above enumeration is not intended to imply, that the authors referred to confided exclusively in the remedies which they particularly sanctioned, since many of them were accustomed to combine and vary resources according to the peculiarities of individual cases.

If the opinion be correct, that the disease usually depends on nervous mobility, associated with derangement of the digestive organs, whether we regard these conditions in the relation of cause and effect, or as simultaneous expressions of the same diseased state, it is equally obvious that two indications are presented, viz. the correction of the morbid state of the digestive organs, and the removal of the nervous susceptibility. The relative degrees of these two conditions doubtless vary. Probably the nervous affectibility is less in Scotland than in England; and from this circumstance we may derive an explanation of the fact, that Dr. Hamilton found purgatives adequate for the cure of the cases which fell under his management, whilst the same mode of treatment has often failed in England. Dr. James Johnson tried purgatives alone without success in cases which afterwards yielded to the administration of oxide of zinc with alteratives and antispasmodics.

Of twenty cases treated by Dr. Bardsley on the purgative plan only fourteen were cured, and the average duration of the treatment was more than six weeks. Of twenty cases treated by purgatives for a time, and afterwards by antispasmodics, the whole were cured in an average period of less than a month. Dr. Bardsley tried the uncombined antispasmodic treatment, selecting remedies of acknowledged power, such as camphor, opium, valerian, ether, and musk. He gave a fair trial to the tonic method, employing the sulphate and the carbonate of iron, the ammoniurets of copper and of iron, oxide of zinc, nitrate of silver, and arsenical solution. He also had recourse to iodine, strychnia, elec-

tricity, the shower bath, tartar emetic ointment and blisters to the spine; and he derived from his experiments the conclusion, that no single plan of treatment was entitled to confidence, and that the combination of purgatives and antispasmodics was the best.

The principle of combination was also countenanced by Sydenham. His method was to employ purgatives, tonics, and antispasmodics; and although he perhaps carried depletion to too great an extent, in other respects it is probable that his treatment has not been much improved by subsequent practitioners. We are strongly impressed with the desirableness of commencing the treatment with purgatives. Underwood has indeed objected to the opinions of Parr and Hamilton, that if the intestinal irritation which they assume exist, it is dangerous to increase it by the employment of purgatives; but whatever may be said of the theoretical explanation, the advantage of commencing the treatment of chorea with purgatives may be considered established.

Dr. Bright, who seems to disparage the purgative plan, employs chiefly calomel, scammony, and senna, and Dr. Bardsley aloetics; but Dr. Hamilton rarely omitted occasional doses of calomel with jalap; and we believe that when this combination is not contra-indicated, it is the most efficacious in the treatment of chorea, freely emulging the biliary ducts without producing much irritation. The advantage derived appears to be proportioned not to the quantity of scybalæ passed, or to the amount of irritation induced, but rather to the production of free secretion without concomitant irritation.

The indications in the management of chorea are, 1. To ascertain the existence of any congestion or irritation of the cerebro-spinal axis, and if such a condition be found to exist, to relieve it by moderate local depletion; 2. To act freely on the bowels by suitable purgatives; and, 3. To administer remedies calculated to invigorate the frame, and thus to diminish nervous susceptibility, and increase the energy of the digestive function.

1. In some cases of chorea, although by no means a large proportion, various symptoms, such as pain and heat of head, throbbing of the carotid or temporal arteries, suffusion of the eyes, tenderness at the back of the neck or other parts of the spinal column, and excitement of mind, indicate congestion or inflammation of the cerebro-spinal axis or its membranes. In such instances the abstraction of blood cannot safely be dispensed with, and should be succeeded by counter-irritation, and the application of cooling lotions to the head and of warmth to the extremities. The state of the pulse will materially assist us in determining the extent to which the abstraction of blood may be carried. Unless the pulse possesses some degree of incompressibility, the application even of a few leeches will often be productive of eventual injury; and it is better to deplete less than the urgency of the symptoms may appear to indicate, trusting to the use of purgatives, which, if not alone sufficient, prove most important auxiliaries in correcting the condition above described. All excitement of the senses must be as much as possible avoided, light and noise being excluded; the mental faculties must be suffered to rest, and moral emotions be restrained.

2. In the simple form of the disease, the judicious employment of purgatives is sufficient materially to moderate the symptoms; we are accustomed to confide chiefly in occasional doses of calomel and jalap, followed in a few hours by castor oil, and repeated at intervals of two or three days. Spirit of turpentine will sometimes prove a valuable auxiliary, especially when there is reason to suspect the presence of worms in the intestinal canal. The number of doses of calomel and jalap must be regulated partly by the appearance of the intestinal evacuations, partly by the effect produced on the muscular disorder, and on the general health. While the evacuations continue scybalous and fetid, the repetition of the calomel is usually indicated; but when the secretions become natural, the occasional employment of milder aperients, such as castor oil, or a combination of the infusions of gentian and senna, may be substituted. Sometimes the irregular muscular actions disappear in less than a fortnight, under the

use of purgatives ; at other times the symptoms are temporarily relieved, but after a few days recur or increase. Under such circumstances we have immediate recourse to the tonic plan, which indeed may often be commenced after the first or second dose of purgatives.

3. In cases characterised by general debility, tonics may be required almost from the commencement of the treatment ; and few cases occur in this country, in which they are not eventually required to render the cure rapid and permanent. The diversity of opinions regarding the most effectual tonic has been already noticed. Dr. Bright prefers sulphate of zinc, especially in cases produced by fright, in doses of from one to ten grains ; in patients of weak and irritable habit, nitrate of silver combined with aloes and myrrh may be suitable : but we have rarely met with instances of which the indications were not readily fulfilled either by the sesquioxide of iron or the sulphate of quinine ; each of which medicines has occasionally succeeded after the failure of the other. In cases characterised by general laxity of fibre, or by decided intermissions, quinine has appeared to be most effectual.

In the majority of instances however, especially in those accompanied with deficient energy of circulation, or in which undue repletion has been employed, iron has far surpassed all other tonics. Dr. Elliotson finds that it may be continued notwithstanding the presence of headach and paralysis, and there seems to be scarcely any limit to the quantity which may be administered. Mr. Maclure has detailed the case of a little girl who took more than thirty pounds in a few months with advantage.

In many instances ten or fifteen grains in treacle or syrup of orange-peel, given three times a day, will accomplish the object ; sometimes it is necessary to increase the dose to several drachms. Valerian and calumba may occasionally be given with advantage combined with iron and an aromatic. By some practitioners antispasmodics have been considered essential, and they must not be despised as auxiliaries ; but we consider them rather as palliatives than remedies, and repose more confidence in the permanency of cures accomplished chiefly by the agency of purgatives and tonics. Dr. Bardsley recommends musk and camphor, in doses of four grains each every four hours, and every evening an enema containing twenty or thirty drops of laudanum in four ounces of assafoetida mixture. The tendency of laudanum to produce constipation and cerebral congestion is an objection to its frequent use, and the object may probably be as effectually obtained by a combination of camphor and extract of henbane. The sulphur bath is very generally used at Paris in these complaints : Baudeclocque has found it almost invariably efficacious. The power of the remedy in improving the condition of the capillary circulation, regulating the bowels, and augmenting the general vigour, render it well-deserving of greater attention than it has yet received from the Profession in England.

Treatment of complicated states. Chorea in the female is so frequently associated with amenorrhœa, that it has been referred by Bouteille to a puberty difficult to establish. In such instances a combination of Pil. Galbani Co. with Pil. Aloes et Myrrhæ forms a suitable medicine. If proofs of congestion be present, leeches may be applied to the upper part of the thighs or to the back ; if there be deficient tone, or a state of anæmia, the Tinct. Ferri Muriatis, or some other preparation of iron, is indicated. In cases accompanied with chlorosis, a combination of iodine with iron is singularly efficacious. A draught containing from five to ten grains of carbonate of iron, and from five to ten drops of tincture of iodine, may be given twice or thrice a day ; or if the bowels be too irritable to bear internal stimulants, the transmission of electrical shocks through the pelvis will sometimes accomplish the object.

Complications with disease of the heart and pericardium, or of the spinal cord and its membranes, require careful treatment : if of an inflammatory nature, well-regulated depletion and counter-irritation must be employed ; if there be rheumatism without inflammation, ammoniated tincture of guaiacum,

with serpentaria and camphor, will be appropriate. Cod liver oil may be given to patients who can tolerate the remedy.

In cases combined with paralysis, or with stuttering, especially when occurring in adults, and exciting suspicions of effusion under the arachnoid, the use of iodine has sometimes produced gratifying results. The iodide of potassium when pure, in doses of from three to five grains judiciously administered, is a safe and powerful remedy. In some cases a course of mercury may be required.

It is obvious that in the treatment of the disorder, as well as in the management of convalescence, the general habits of mind and body, and the regulation of diet, demand especial care.

The shower bath, and subsequently sea bathing, are useful tonics, especially when followed by friction of the skin. Mineral waters adapted to the peculiarities of the individual case may be employed with advantage—Pymont, Spa, Tonbridge, and other chalybeates, being well-adapted to the pallid and leucophlegmatic; Ems to cases characterised chiefly by irritation; and Carlsbad perhaps more especially to instances of the disease associated with the strumous habit. Free exercise in country air is very desirable, and the use of the skipping rope, horse exercise, or other sports accustoming the muscles to prompt and accurate subserviency to the will, should not be neglected.

HYSTERIA.

General observations. — Division into three forms—regular—irregular—complicated. — Diagnosis. — Prognosis. — Causes. — Nature. — Curative treatment. — Moral management and preventive treatment.

THE term Hysteria, although established by long usage, seems to have been generally employed with more than the ordinary vagueness too often characteristic of attempts to designate disease. It is also liable to the objection of suggesting a theory of the complaint, which is extremely questionable; yet as attempts to substitute other titles have not been more successful, we might readily submit to the etymological inaccuracy of the appellation, if it answered the useful purpose of conveying to the minds of medical men the idea of a certain and definite series of phenomena. Unfortunately, however, the idea attached to the name by various practitioners is almost as varied as the phenomena themselves; and the word Hysteria owes perhaps much of its popularity to the convenience with which it may be employed to cover our ignorance, and to furnish a receptacle for those cases which, in the present state of our knowledge, cannot easily be referred to any distinct place in the nosological arrangement. It must be allowed that the progress of Pathology has not materially tended to curtail these cases, but it is on that account the more important to endeavour to fix their limit, and to assist the student in their recognition. The peculiarities of individual constitution occasion varieties in the phenomena of most complaints, which render it extremely difficult to frame definitions accurately representing their essential characteristics. It cannot, therefore, be deemed surprising that a disease, preeminent in the irregularity and variety of its symptoms, should defy all attempts at rigid definition, although a description of its principal phenomena may be given sufficiently specific for practical purposes.

The phenomena of the hysterical paroxysm are well-known; but those who are prone to such attacks are often subject to other affections, naturally referred to the same predisposition.

A similar condition not infrequently exists in some who rarely or never present the more prominent phenomena; and we therefore find it necessary to treat of the disease, not merely as an assemblage of certain characteristic symptoms, but also as a general condition disposing to the production of various analogous disorders, when suitable exciting causes are presented. We may therefore describe hysteria as a peculiar nervous susceptibility, leading to the production of symptoms remarkable for the capriciousness of their character, the changeableness of their seat, and the suddenness of their accession and subsidence, the function of nutrition being seldom interfered with, notwithstanding their severity and long continuance. The mental condition of hysterical females is generally modified, and often distinguished by sensitive feelings, sudden impulses, and fickle temper. Sufficiently well-marked cases of the disorder have occurred in men, under the influence of sexual restraint or of depressing passions; but it more especially appertains to women, whose originally susceptible nervous system has been rendered more than naturally mobile by an injudicious system of education: and it is from the age of puberty to the cessation of the catamenial function that the greatest liability to the malady is observable.

The difficulty of conveying an idea of the varied phenomena of hysteria will perhaps be diminished by describing the disease under three forms,—the *regular*, the *irregular*, and the *complicated*. This division will best enable us to exhibit the characteristic features of the malady, although, when we come to the subject of treatment, it will be necessary to modify the arrangement.

1. *Regular Hysteria*. The *regular* form may be distinguished by its strikingly paroxysmal character. The patient does not necessarily present any symptoms of habitual disorder, but is liable, under the influence of slight exciting causes, physical or mental, and sometimes without any appreciable cause, to sudden attacks of a spasmodic nature. After feelings of general uneasiness, and perhaps headach, cramp, or stiffness about the throat, and a vacant stare, or irregular movement of the eyeball, a sensation as of a ball is felt in the left iliac region, which, rising upward to the throat, produces the feeling called *globus hystericus*, sometimes followed by a violent fit of laughter, alternating with weeping, and in milder cases the patient quickly returns to her usual state. In more severe seizures there is great mental and bodily agitation, oppression of chest, dyspnœa, palpitation, and incapability of utterance. The sufferer falls down, and beats her breast or the pit of her stomach, in which situation there is often violent pain. The breathing is slow and laborious; the abdomen extremely distended and flatulent. Sometimes the patient strikes her head, tears her hair, and attempts to bite her arms, or even the persons who may be near her. The limbs are either motionless or convulsed; and the body is perhaps supported on the heels and back of the head. The violence of the contortions may occasionally intermit, and be again renewed, but after considerable eructation, vehement expiration, and perhaps sobbing or laughing, the patient comes to herself, often retaining, but not generally acknowledging, a recollection of much that has passed during the paroxysm, but complaining of fatigue, and sometimes suffering from temporary paralysis of the bladder, arms, or other muscles either of voluntary or involuntary motion. Frequently there is a copious excretion of limpid urine. In some instances the fit lasts for several hours, and instead of the usual favourable termination, passes into a state of coma, or of syncope, rather peculiar in its character, and sometimes so closely resembling death as to have led to serious mistakes.

Those who are liable to attacks of regular hysteria, usually possess a susceptibility, which renders them prone to hurried breathing, or to sighing, sobbing, or laughing, under the influence of ordinary emotion, and they are, for the most part, apt to pursue objects with ardour, and to exaggerate grievances. The more severe paroxysms chiefly occur when the catamenia are suspended, the bowels torpid, or the digestion deranged. Those who have been long subject to these attacks frequently have tenderness at the sides of some of the vertebræ,

which, however, is seldom suspected by the patient, and only discovered by a close examination.

When the complaint has continued for many years unchecked, the nervous system becomes more seriously affected, and paraplegia, weakened memory, or even mania, may ensue.

2. *Irregular Hysteria.* The irregular form of hysteria may exist without the occurrence of decided paroxysms. The phenomena which it presents are indescribably various. There is scarcely any part the function of which it may not disturb, so as to excite the suspicion of organic disease: but the rapidity with which the morbid condition is transferred from one part of the system to another, and the marked disproportion between the symptoms, are generally sufficient to indicate the real nature of the malady, although there is probably no class of cases in which errors of diagnosis are so frequent.

The most constant symptom is pain under the left mamma, confined to a small space, and not necessarily increased by a deep inspiration. Sleep is generally disturbed; there is great susceptibility to impressions, whether bodily or mental, and generally a liability to palpitation, spasmodic cough, flatulent colic, tenderness of skin, or to neuralgia of a peculiar character. A few of the more marked phenomena require particular notice. Hysterical *headach* is sometimes fixed to one spot, particularly of the forehead, over one eye, producing the sensation as of a nail driven into the part; hence called *clavus hystericus*; at other times it may affect the whole head, and be attended with tenderness of the scalp, intolerance of light or sound, and other symptoms of phrenitis. This state is often associated with an irritable condition of the uterus; it is not removed by the remedies of indigestion, but is generally relieved by nervine medicines.

The subjects of irregular hysteria generally evince much capriciousness, inconstancy, and irritability, and are sometimes liable to temporary *delirium*, presenting a very peculiar character, intermediate between somnambulism and mania. One patient will hide her head under the bedclothes and shun observation; another will employ outrageous language, and endeavour to injure those who approach her, to destroy children, or to commit suicide; a third will sing, or repeat words in some language with which she is not ordinarily familiar, but of which, under this particular state, she seems to possess a vivid recollection.

The hysterical condition sometimes produces *dysphagia*. It is not necessarily spasmodic, but may depend on defective action of the voluntary muscles. The difficulty of swallowing is sometimes so great as to excite suspicions of hydrophobia. The opposite condition of remarkable avidity for swallowing has been observed. In the *Dublin Medical Journal*, vol. iii. an interesting example is related by Dr. Graves, in which any attempt to interrupt the process of swallowing was followed by hysterical convulsions. The œsophagus is sometimes so remarkably sensitive, that the introduction of a probang is sufficient to produce a decided hysterical paroxysm. (*Bright's Medical Reports*, vol. ii. p. 257.) Sydenham observes that hysterical patients often spit a thin saliva for many weeks, as if produced by Mercury: the same phenomenon has been noticed by Mauriceau, Stoll, Rowley, and Darwin. Dr. Graves thinks it is secreted from the fauces. In some hysterical subjects we have observed the tongue covered with a profuse thick secretion resembling cretaceous mixture.

The laryngeal muscles may be either in a state of irritation or of deficient power. The former state not unfrequently occurs in young hysterical females, producing in some instances spasmodic closure of the glottis; in others fits of loud convulsive cough, often followed by stridulous inspiration and threatened suffocation. The attack generally comes on in the evening; it may last two or three hours, and close with a common hysterical fit, or with syncope or convulsions, but is never fatal. The intervals of healthy respiration, the absence of fever, of pain on swallowing, or of tenderness on pressure, distinguish this affection, when simple, from chronic laryngitis; but in some instances the two disorders exist together.

Hysterical cough may be hard, loud, and solitary, producing hurried breathing, palpitation, and perspiration, and is sometimes followed by a long sonorous expiration, not unlike the howling of a dog. At other times the paroxysm consists of short, rapid, tearing coughings, producing great distress and exhaustion. Mental emotion is a frequent cause of these affections; and it is worthy of notice that, of three cases of this character mentioned by Dr. William Stokes, one on dissection exhibited proofs of meningitis; and the phenomena of the other two furnished strong grounds for suspecting a similar condition. (*Treatise on the Diseases of the Chest*, p. 266.)

Loss of voice may occur at the catamenial period from mental emotion, or from slight intestinal irritation. It comes on and ceases very suddenly, often without evident cause. Any great excitement sometimes restores the power of articulation for a time, but on its cessation the voice is again reduced to a whisper.

Hiccough is occasionally among the phenomena of irregular hysteria, or an exclamation resembling the latter half of hiccough, which we have known to continue without intermission for many days and nights.

Palpitation of the heart, characterised by extreme violence, and by the slight nature of the causes which induce it, is no uncommon occurrence. Bellows' sound, in the region of the aorta, is sometimes produced in such patients by mental emotion; but its irregularity and want of persistency soon betray its nervous origin.

The stomach is, in some instances, peculiarly irritable, rejecting a large portion of every thing taken into it. The vomiting is not much influenced by the nature of the diet, and is often accomplished with very little effort. It generally occurs soon after taking food, but may sometimes be controlled by a powerful effort of the will, and it is remarkable how long it may continue, without materially impairing nutrition.

Spasm of the abdominal muscles producing a hard and knotted surface is occasionally observed.

Tympanitic distension of the abdomen may proceed to such a degree, as to cause the patient, if immersed, to float on water; and, through neglect of the simple expedient of percussion, has been mistaken for ascites. This state probably depends sometimes on partial paralysis of the intestinal muscles; sometimes on secretion of gas. The gas thus produced, in a case of hysteria, was analysed by Dr. Osborne, and found to consist of carbonic acid gas with a slight proportion of nitrogen, hydrogen, and carburetted hydrogen.

Hysterical ischuria is more frequent than is generally supposed, being often overlooked by the practitioner, or concealed by the patient. It sometimes depends on deficient secretion, at other times on defective action of the will. In the former case the affection is not relieved by the catheter, and in the latter is rendered more obstinate by its use.

There is a form of neuralgia which may justly be considered hysterical. It comes on suddenly, is generally attended with puffiness and tenderness of the skin, and often with alternate heat and chilliness of the part affected, and is peculiarly apt to migrate from one place to another. The pain under the left breast, which may almost be considered pathognomonic, more particularly of irregular hysteria, is probably of a neuralgic character.

The joints enjoy no immunity from the all-pervading influence of the disorder, but are liable to be affected with morbid sensibility or severe pain. The hip and knee joints are the most frequent seats of the complaint; and in the latter the inner side, and apparently the branches, of the anterior tibial nerve. Serious local disease is too often suspected, and sound limbs have sometimes been sacrificed to this mistake. With a view to diagnosis it may be observed, that pinching the skin gives as much pain as pressure on the joint; that examination gives less pain, if attention is directed to other objects; and that there is no wasting of the limb, or painful starting in sleep. To enforce the importance of such discrimination, it will be sufficient to quote the remarkable statement of Sir Benjamin Brodie,—"I do not hesitate to declare,

that among the higher classes of society at least four fifths of the female patients who are commonly supposed to labour under diseases of the joints, labour under hysteria and nothing else."

The voluntary muscles may be affected in different degrees of violence or extent. One or more muscles is sometimes attacked with paralysis, as complete, while it lasts, as that which arises from softening or compression of the spinal cord. At other times there is periodical or permanent contraction of the limbs; or a condition which has been denominated "leaping ague," characterised by a remarkable propensity to skip, swing, dance, and jump, in a degree to which the powers of the patient, in the natural state, would be unequal.

Various perverted sensations, such as inordinate hunger and thirst, might here be noticed, but the catalogue of symptoms is already sufficiently voluminous. We have known the majority of those above described to occur successively in the same individual, but a very few, if well-defined, will be sufficient to authorise our referring them to that remarkable disorder which has defied "all systems of nosology, all doctrines of pathology, and all kinds of remedy except time."

3. *Complicated Hysteria.* When other diseases attack persons of hysterical constitution, the symptoms of the two complaints may be so blended, that the more important malady may be modified or even masked. Such a complication may increase the formidable aspect of the principal disease, without necessarily augmenting the danger, although it may eventually augment existing disorder by promoting inflammatory action at the extremities of irritated nerves.

Common continued fever is often ushered in by hysterical phenomena, which may also indeed occur during its course, especially in the form of croupy breathing, spasmodic action of the abdominal and respiratory muscles, fits of laughing and crying, &c. During convalescence from fever, such phenomena may appear in males as well as in females, and are probably in part dependent on debility. When hysterical complications attend the latter period of phthisis, or of other chronic diseases, the pain of head, throbbing of the carotids, and excitement of the imagination, by which they are often characterised, may induce an apprehension of phrenitis; but free depletion rather aggravates than relieves the symptoms. To attempt a description of all the various complications of hysteria would, however, be a vain and useless task.

Diagnosis. There are few disorders which hysteria does not occasionally simulate; but the variety, changeableness, and incongruity of the symptoms; the irregularity of their course, and the rapid alternations of violent derangement, and of a nearly natural state with which they are attended, generally disclose to the observant practitioner the true nature of the malady. When accompanied with spasmodic phenomena the disease may be mistaken for epilepsy, and in its chronic form for hypochondriasis.

The genuine epileptic paroxysm is generally sudden, making its onset with a shrill cry; the eyeballs are distorted; the pupils dilated; the teeth ground against one another, or closed upon the tongue, which is protruded from the mouth; the face is swollen, discoloured, or ghastly, and the larynx spasmodically closed, occasioning ineffectual efforts at expiration. The fit is followed by heavy sleep, and on waking the patient does not recollect what has happened. The countenance of those who have suffered long from the complaint, becomes dull and inexpressive. The hysterical paroxysm seldom occurs in the streets, and is characterised by laughing, crying, and the sensation of globus; the muscles of the face and the pupils of the eyes remain nearly in their natural state; the respiration is heaving and sighing. After the fit the patient has more or less recollection of what has passed; and although disposed for quiet, seldom falls into profound sleep. There is in general no evidence of organic disease, and the habitual physiognomy is restless or lively. A combination of the two conditions may however occur. In *epileptic hysteria* the patient laughs on one side, and the eyeballs are distorted. In hysterical

epilepsy the fits are more frequent than in pure epilepsy, and are more apt to be produced by mental emotion.

Hypochondriasis and hysteria have been regarded as identical by various authors, particularly by Lepois, Highmore, Sylvius, Sydenham, Boerhaave, Van Swieten, and Whytt; but the more ancient opinion of their diversity, supported by Hippocrates, Celsus, Galen, and Aretæus, has been in later times sufficiently established by numerous writers, among whom Willis, Hoffmann, Sauvages, Cullen, Pujol, Louyer-Villermay, Georget, and Brachet, hold a conspicuous place. The last mentioned author regards hysteria as a spasmodic affection of the cerebral nerves, and hypochondriasis as a morbid condition of the ganglionic nerves, but it is very questionable, whether the present state of physiological knowledge authorises such theoretical refinement. It may be sufficient to mention, that hypochondriasis is characterised by a false direction of the moral energy, and is generally associated with inactivity, a concentration of interest upon self, and a disposition to have recourse to a great variety of medical practitioners. Hysteria is accompanied with vicious innervation, fitful activity, and often with a lively interest in the welfare of others, and with confidence in the usual medical attendant. The former disorder is marked by sullen countenance, gloomy ideas, and dejected spirits; the latter by a restless animated expression, convulsive paroxysms, and fickle temper. We must however, remember, that the two diseases are not incompatible, and that *hysterical* hypochondriacism does occasionally occur.

The circumstances which may assist in distinguishing various isolated affections incidental to irregular hysteria from organic diseases of the same parts have been already noticed; it must be here noticed, that the coma of hysteria may be distinguished from apoplexy by the variableness of the pulse, and the occasional intervention of symptoms inconsistent with compression of the brain. The tenderness of abdomen present in some hysterical cases may be distinguished from peritonitis by its superficial character, and by the absence of the sinking or yielding physiognomy which serious disease of that part usually produces. The concurrence of regular pulse with violent pain, or of irregular pulse with slight symptoms, and the presence of other and well-known hysterical phenomena, rarely fail to elucidate the real nature of the disorder, however alarming it may at first sight appear. Laycock mentions plumpness of the form, large mammæ, and dark areolæ, as characteristic of the hysterical diathesis, and when these circumstances are present they certainly merit attention.

Causes. Dubois has advanced the opinion, that hysteria is an exaggeration of the sanguineo-nervous temperament. (*Hist. Philos. de l'Hypochondrie et de l'Hysterie.*) Persons possessing that constitution are doubtless particularly prone to the disease; but a certain mobility or affectibility of the nervous system seems also necessary. Parents who are gouty, epileptic, or in any way sickly, are most apt to engender this condition in their offspring; but the conduct of early life may also remarkably conduce to its development. The various emotions resulting from social life, rendered more frequent and intense by civilisation, and the exercise of the sensations rather than of the active powers incidental to the same state, appear to increase the general susceptibility of the nervous system. From the influence of luxury, indolence, and sentimental reading, the hysterical habit is becoming a common characteristic of the female inhabitants of towns, and gaining increased prevalence among our country population. In like manner females who have been long enured to an active hardy life, when removed to the mansions of the opulent, often acquire the hysterical susceptibility. The causes of plethora sometimes induce a liability to hysteria in nervous habits, and particularly to the convulsive form of the complaint; but the disposition is more frequently produced by the causes of debility, such as a sedentary life, attacks of fever, excessive evacuations, or the long-continued use of sedative, depletory, or irritating remedies.

Nature. The question regarding the intimate nature of hysteria is one of

peculiar difficulty, rather increased than diminished by a reference to its literary history. Hippocrates adopting the opinion of Pythagoras and Plato, that the uterus was an animal, referred the phenomena of hysteria to the wanderings of this animal to the head, throat, liver, and limbs. Aretæus embraced the same absurd doctrine. Galen refuted the notion of the movements of the organ, but agreed in making it the seat of the disease, and Ætius illustrated the view of Galen. The theory of Hippocrates was afterwards revived by Holler and Duret, to be again confuted by Baillou, who substituted for the movements of the uterus, a chilling malignant humour arising from the same source.

The principal views which have since been entertained by authors may be arranged as follows:—1. Hysteria has been referred to a morbid condition of the uterine nerves by Cullen, Pinel, Lientaud, Louyer-Villermay, and Foville, &c. and to chronic inflammation of the uterus by Pujol. 2. A morbid condition of the stomach with imperfect digestion, producing, according to Cheyne and Parry, acid humours, and, in the opinion of Pitcairne, imperfectly concocted blood, affecting the brain through the arteries, and to gastro-enteric inflammation by Broussais. 3. Congestion of the lungs and heart by Highmore, and of the vena portæ by Stahl. 4. A morbid condition of the nervous system generally by Dumoulin, Loob, Pomme, Lorry, Whytt, Tissot, Boerhaave, Hoffmann, Sauvages, Andral, and numerous other writers. 5. A morbid condition of the brain or cerebral nerves by Lepois, Willis, Barbeyrac, Georget, and Brachet. 6. A morbid condition of the spinal cord by several recent authors, and of the ganglionic system by Van Swieten, Lobstein, and Willis. Amard ascribes hysteria to disorder of the lower portion of the spinal cord. Frank, M. Colson, Drs. Bradley, Brown, Darwall, Griffin, and Marshall, refer it to a more or less general irritation of the same organ; and Tate, to spinal irritation connected with irregular or defective catamenia.

The information afforded by morbid anatomy respecting hysteria being almost entirely of a negative character, affords us but little assistance in the attempt to determine its essential nature. Villermay has quoted cases from Diamerbroeck, Vesalius, and Morgagni, to prove the frequent coexistence of disease of the ovaries. Georget has endeavoured to connect the phenomena with changes in the brain, and Broussais with morbid appearances in the intestinal canal; but no sufficient evidence has yet been adduced to prove the dependence of hysteria on any structural change, and we are therefore left to form our opinion chiefly from analogy.

Extensive disordered action may be considered as a change of vital properties; and since life is not monopolised by any one of the organs or structures, but diffused through them all, we must avoid the error of hastily limiting disease to single organs, which may perhaps be affected only as parts of the whole. At the same time the evidence adduced by Geoffroy St. Hilaire and Serres, to show that the development of the body has a remarkable reference to the nervous system, and the instances continually presenting themselves in which various functional disturbances are produced by causes acting directly on the nervous centre, authorise the suspicion that a disorder, characterised by peculiar nervous susceptibility, depends on a morbid condition of this particular system; and although physiology does not at present enable us to fix precisely the functions of individual parts of the nervous system, yet a remarkable analogy may be traced between the effects produced by indisputable changes in the cerebro-spinal axis and the phenomena of the disease under review. We believe with Dr. Marshall Hall, that the spinal cord is "the axis of a system of excito-motory nerves, which is the peculiar seat of action of certain diseases, and of certain causes and remedies of disease;" and although the nature of such actions may be inappreciable, there are various considerations which give force to the opinion that they constitute the essential source of hysterical disorder.

Injuries and diseases of the spinal cord often produce effects resembling

the phenomena of hysteria. Krimer found the urine become limpid when the cord was divided in the dorsal or lumbar region; Chausset observed loss of voice produced in dogs by division of the cord in the neck; and Nassé noticed the same result from its division in cats and rabbits.

Inflammation or disorganisation of the cervical portion of the cord often produces vomiting, impaired deglutition, sensitiveness of the œsophagus, or interrupted respiration; and a similar condition of the cervical or dorsal region may occasion convulsions or palsy of the muscles of the trunk; and it is a natural conclusion that phenomena similar in kind, though less permanent and less severe, may result from functional disturbance of the same parts. This opinion derives strong confirmation from the case recorded by Dr. Billing, of a man aged twenty-eight, who, having strained his spine by falling with a heavy load, suffered afterwards from globus hystericus and palpitation. (*Lancet*, vol. iv. p. 426.)

Various hysterical symptoms are often associated with puffiness of the integuments, and a peculiar sensitiveness of the cutaneous nerves of some part of the spine, and may often be increased by pressure at the sides of the vertebræ. We have observed this condition in connection with painful affections of various parts, difficult deglutition, cough, eructation, colic, and fainting. Such symptoms are frequently relieved by local treatment directed to particular parts of the spine.

It is true that some phenomena illustrative of hysteria may be produced by irritation of the sympathetic ganglia: for example, contraction of the intestines from irritation of the splanchnic ganglia or celiac plexus, as proved by Volkmann and others; but this fact is not inconsistent with the explanation proposed, since there is reason to believe that the brain and spinal cord are the chief sources of power to the organic nerves, and the reflex action of the sympathetic is most readily excited by irritation of the cerebro-spinal.

It is highly probable that interference with that part of the nervous axis more directly connected with the eighth pair is the condition most essential to the production of the characteristic phenomena of hysteria, the parts supplied by this pair being so remarkably influenced by the disorder, and its lesion, from whatever cause, being productive of analogous changes of function. Brachet found the sensation of hunger, which is apt to be morbidly felt in hysteria, suspended by the division of the par vagum; and Gendrin has related an interesting case of cough of a decidedly hysterical character produced by exposure of this nerve to the atmosphere, in consequence of opening a neighbouring abscess, which subsided as soon as a cicatrix perfectly closed the wound. In order to appreciate the important relations of this nerve, we must remember its communication with the corpora restiformia, the corpora olivaria, and with those fibres of the corpora pyramidalia, which pass into the cerebellum: we may thus trace its influence on sensation and respiration; and if the views of Gall and Spurzheim be true, we may even derive an explanation of its relation to sexual conditions through the cerebellum. If the opinions of Bellingeri be correct, we can readily understand how increased, perverted, or impaired sensations or motions of various parts may be produced, according as different portions of the grey or white matter are most affected; and we may refer interference with the state of the rectum or bladder to a similar disturbance of the lateral strands of the medulla spinalis. The close connection of the different parts of the cerebro-spinal axis, and the ready transference of congestion or irritation from one part to another, will readily explain the mutability of hysterical symptoms; and we thus reduce to a simple and connected arrangement the "disorderly heap of phenomena," of which the disease has been defined to consist.

Dr. Conolly is of opinion that causes productive of irritation in various viscera may occasion the nervous disturbance producing hysteria; but Dr. Copland thinks it essential, that the nervous or vascular condition of the sexual organs should first be affected. It seems difficult, however, to reconcile

the doctrine, that the uterine system is necessarily concerned in the production of hysteria, with the fact, that the disorder may coexist with every appreciable variety in the condition of this system, with menorrhagia or amenorrhœa, with inflammation in various degrees, or without any disturbance at all. The existence of a *special irritation* seems scarcely consistent with such a variety; and when the function of an organ is unaltered, there is no ground for supposing it disordered.

The occurrence of all the characteristic phenomena in men is fatal to the uterine hypothesis. Napoleon in his boyhood is said to have had a fit of hysteria from wounded pride. Dr. Ferrear (*Medical Histories and Reflections*) relates the case of a young man affected with globus hystericus and apparent insensibility, yet retaining consciousness, and who was treated successfully with an emetic, antispasmodics, and afterwards tonics. In the *Edin. Med. and Surg. Journ.*, vol. xi. there is an account of a strong, healthy man who had alternate laughing and crying, and inability to speak, from a feeling of something in the throat. If additional evidence be required of the occasional occurrence of hysteria in men, we might refer to the statements of Lepois, Willis, Whytt, Sydenham, Hoffmann, Trotter, Cullen, Watson, Georget, Conolly, Billing, and even of Villermay; and although some of the cases described by these writers may seem referrible to sexual conditions, there are many which are not capable of such an explanation. Several have fallen under the observation of the author in children of each sex, and in adults under circumstances of debility or mental depression, which cannot be referred to such causes; and it cannot be denied that treatment applied to other parts will often effect a cure without changing the condition of the sexual organs. At the same time it is readily allowed that, owing to its great nervous endowment, the uterus must be fully as competent as other organs to produce sympathetic disturbance of the nervous centre; and it is equally natural to conclude, that an organ possessing such intimate association with that centre must be peculiarly liable to be affected by its derangements: and hence it will often be a problem in such cases, whether the uterus is primarily or secondarily concerned.

In his very instructive work on local nervous affections, Sir Benjamin Brodie has attributed the susceptibility to their occurrence to imperfect development of the nervous system; but since of all the parts of the body the nervous system is perhaps that which least frequently exhibits marks of insufficient development; since it often contributes by its derangements to the disorganisation of other parts, and yet survives the ruins it has caused; and since in maladies of a nervous character its actions are rather perverted than enfeebled, and more frequently exalted than deficient, whilst the susceptibility to them is greatest in youth, and diminished by the progress of age, this opinion, notwithstanding the deserved eminence of its author, seems to be questionable.

When the condition of the nervous system above described exists, a very slight excitement will be sufficient to induce hysterical symptoms. Among these, emotions of mind of whatever kind, as of grief, joy, unrequited affection, jealousy, disappointment, or surprise, are conspicuous. The force of imitation is also very remarkable. Dr. Mead supported the popular opinion, that the fits were peculiarly liable to occur about the time of new and full moon. Fanciful as such an opinion may be, we are not perhaps authorised entirely to repudiate statements regarding lunar influence on the animal frame. The opinion that electrical agency may affect nervous subjects is gaining ground, and has the decided support of Rostan. The principal exciting cause, however, is irritation in some important organ; and since the association of hysteria with such conditions is the most important circumstance in reference to treatment, it will be found desirable to adopt a corresponding division of the malady as the basis of a more simple and available arrangement of practical remarks.

Treatment. During a paroxysm of hysteria it is important to adopt such measures as may be necessary to prevent the patient from sustaining injury during the violence of the struggles. Any tight clothing about the neck or

waist should be loosened. Cold water may be sprinkled on the face, and stimulating scents applied to the nostrils. If the patient can swallow, a dose of ether, fœtid spirit of ammonia, or tincture of valerian, may be administered, or an enema of assafœtida, turpentine, or of iced water, which is recommended by Professor Chiappa as peculiarly effectual in arresting the fit. Some modifications of treatment are required even during the paroxysm, by peculiarities of the individual case; and in the intervals they are more especially requisite according to the varieties of aspect which this Protean malady assumes; but it is hoped that an arrangement may be introduced, by means of which the principles of treatment may be simply expounded and readily applied. If the view which has now been offered be correct, namely, that the essence of hysteria consists in a peculiar disorder of some portion of the nervous centre which may produce the symptoms, either spontaneously under ordinary influences, or by irritation communicated from other organs, we obtain a division of the disorder into the *idiopathic* and the *sympathetic*. It is probable that the brain cannot produce the symptoms except through the medium of the spinal cord, yet, as these parts are so closely connected, we shall combine them in our view of the idiopathic form of hysteria, and consider it a cerebro-spinal disease.

Sympathetic hysteria may probably be produced by disorder of any organ, since even a wound of the finger may occasion it; but as its principal sources are the intestines and the uterus, we shall embody our remarks on the treatment of the disorder under the divisions of intestinal and uterine.

Idiopathic Hysteria. In this form there is no evidence of disorder of any organ except the cerebro-spinal axis, but the conditions of this part may vary in different cases, so as to require a corresponding modification of treatment. The principal diversity regards the state of the circulation; and it is therefore convenient to subdivide this form into, 1. the congestive, either with general plethora or local determination of blood, and, 2. the atonic.

1. The congestive variety of idiopathic hysteria often depends on a state of general plethora. This condition is apt to occur in those who are well nourished, and lead a sedentary life. It generally assumes the form which, in the preceding arrangement, has been described as regular hysteria, and is characterised by violent paroxysms occurring most commonly just before the return of the catamenial period. The convulsions are often severe, the face flushed, the arteries of the neck and head throbbing, the conjunctival vessels distended. In some cases fatal coma has followed these attacks. This, therefore, is the form of hysteria in which depletion is generally safe, and sometimes necessary. During the paroxysm, bleeding or cupping between the shoulders will be desirable. Cold should be applied to the head, and if stimulants be administered, the ammoniated tincture of valerian should be given rather than brandy. The purgative plan must be subsequently adopted. A dose of calomel with jalap or colocynth should be promptly administered, followed by a more or less continued use of saline purgatives combined with senna. The occasional repetition of the calomel may be requisite. Late hours, hot rooms, and feather-beds must be avoided, the diet must be light and unstimulating, and exercise on foot must be enforced. As in this form of the disease the paroxysms are generally ushered in with headach, cupping on the first occurrence of that symptom will often avert the attack; but it will be important, by an assiduous attention to diet and medicine, to obviate the necessity of a very large abstraction of blood. Other cases are associated with local congestion rather than general plethora, and require much care in their investigation and treatment. When the brain is chiefly affected, there may be headach and flushing of the face. One part of the head may be hotter than another: there may be occasional delirium, or some peculiar form of temporary monomania, as a disposition to destroy children or to commit suicide. The sudden occurrence of the symptoms, their temporary and variable character, their dependence in many instances on moral excitement, and their association with other hysterical phenomena, will enable the practitioner to distinguish them

from cases of chronic derangement. The patient sometimes lies unconscious of all around her, with torpor of the senses, or even with dilated pupils: but in addition to other modes of distinguishing this from the hydrocephalic or apoplectic states, it may be mentioned that the countenance retains more intellectual expression than in those disorders. In these instances leeching, or cupping *moderately employed*, are often advantageous, or if the strength seems unequal to the abstraction of blood, dry cupping will sometimes answer the purpose. Five or six glasses applied to the nape of the neck, and retained there for ten or fifteen minutes, will often avert the hysterical fit, if employed as soon as headach or other symptoms indicate its approach. Turpentine is a useful remedy. A drachm suspended in mucilage, with the addition of a few drops of tincture of capsicum, may be administered three times a day, or several drachms combined with castor oil may be introduced as an enema. Great attention must be paid to the regulation of the bowels and to the promotion of a free catamenial secretion.

When local congestion about the spinal cord exists, there will in most instances be found puffiness and tenderness of the part affected. The tenderness probably depends on a sympathetic condition of the cutaneous nerves, for the spinal cord is too well protected to be directly influenced by external pressure.

A large proportion of cases of irregular hysteria are associated with this condition, particularly those characterised by spasmodic closure of the glottis, spasmodic cough, dysphagia, palpitation, hiccough, and vomiting. These phenomena are faithfully described and instructively illustrated in Griffin's work (*On Functional Affections of the Spinal Cord*). Dr. Griffin even supposes that there is a special relation between the organs affected and certain parts of the cord: thus, that palpitation, vomiting, inordinate hunger and thirst, epigastric pulsation, and cough, depend on affections of the cervical region; disorders of the stomach and colon, loss of voice, pain in the chest and arms, on those of the dorsal region; whilst irritation of the lumbar portion produces affections of the hip joint, colic, menorrhagia, ischuria, constipation, or paralysis of the legs. Such a relation may, no doubt, often be observed; but considering the close connection of the different parts of the spinal cord, we need not be surprised to find frequent deviations from the rule. Much caution is required in the treatment of these affections, the hysterical susceptibility of the cerebro-spinal system being associated with a peculiar sensitiveness to any disturbance of the balance of circulation, whether on the side of excess or of deficiency. When the strength has been good, we have repeatedly witnessed great advantage from the application of a few leeches to the tender part of the spine, and subsequently from counter-irritation by blisters or tartar emetic ointment; and have known a case of vomiting, apparently hysterical, of two years' duration, yield in a few days to this simple treatment. In cases associated with isolated affection of the spinal cord, two blisters, one on each side of the part, are the best counter-irritants: when the affection is more extensive and chronic, antimonial ointment is probably more effectual. Palpitation of the heart and teasing cough may often be relieved by the same means. The cough is temporarily relieved by antispasmodics, as ether; more completely by a combination of ammoniacum and prussic acid; but counter-irritation can rarely be omitted, and sometimes a slight course of mercury is essential.

In cases of spasmodic closure of the glottis, cold water should be thrown on the face, and ammoniacal salts applied to the nostrils. The fauces and pharynx may be tickled with a feather or with the forefinger; the retching, and consequent expiration thus induced, engage the laryngeal in one combined act with the other respiratory muscles, and the spasm of the glottis is thus overcome.

In the epileptic form of hysteria with spasmodic closure of the jaw, we may

often succeed in opening the mouth by firmly compressing the muscles attached to the hyoid bone. Mr. Laycock supports this recommendation by mentioning a case of spasm of the glottis in an adult male, in which inspiration immediately followed pressure of the thyroid cartilage. (*Med. Gaz.*, 1838.) If this method fail, the object may sometimes be accomplished by forcibly overcoming the tetanic flexion of the forearm and fingers. The relief thus obtained may be temporary, but it gives an opportunity for the administration of valerian or assafoetida. Hysterical hiccough is occasionally relieved by the same measures which prove useful in cases of cough and palpitation: one case however, of a severe character, which had lasted for weeks, and continued during sleep, resisted this method, but was cured by a blister to the epigastrium.

In the class of cases under review the author has given a trial to veratria in the form of unguents, but it has not appeared so effectual a counter-irritant as the tartar emetic ointment.

When a *tympanitic state of abdomen* appears to depend on the condition of the spinal cord, turpentine is often useful; and when this remedy has failed, alum in considerable doses has accomplished a cure. Dr. Abercrombie has referred to some interesting cases, probably of this class, in which the application of galvanism proved remarkably efficacious. This agent is perhaps peculiarly suitable when the tympanic condition depends on partial paralysis of the muscular coat of the bowels. In all cases of this class it is essential to obviate hepatic congestion, and to prevent intestinal accumulation. The long-continued use of a stimulating embrocation rubbed freely along the whole course of the spine is a valuable auxiliary; and when the more urgent symptoms are removed, exercise, whether on horseback or on foot, tends to lessen the morbid susceptibility, and probably the disposition to congestion. In most hysterical cases the long-continued use of mercury is greatly to be deprecated, although occasionally necessary, as in the treatment of some cases of obstinate barking cough.

To the class of cases depending on spinal congestion may probably be referred many instances of diminished power of volition, some of which also follow mechanical injuries of the spine. In these cases medical treatment accomplishes little, but some sudden moral excitement seems occasionally adequate to rouse the voluntary power, and to transmit its influences to the muscles. It is chiefly on these cases that alleged miracles, such as those of Prince Hohenlohe, have been wrought.

2. The *atonic* variety of idiopathic hysteria is most frequently witnessed in patients who, on account of some severe disease, have undergone free depletion, or taken mercury to excess; as, for example, in the course of treatment required for rapid ulceration of the cornea; and it is interesting to observe, that the change to the tonic plan is generally as useful to the local complaint, as it is essential to the control of the hysterical malady.

In some of these instances tenderness occurs in the spine, but it generally exists also in other parts of the body. It is aggravated by leeching, which may even be followed by paralysis. It is not uncommon to witness great cerebral excitement, sleeplessness, throbbing of the carotid and temporal arteries, and intolerance of light and sound. Such cases are sometimes unhappily mistaken for phrenitis; but the sudden changes in the severity of the symptoms—the pulse not being characteristic of alarming local disease—the existence of other hysterical complaints, as tympanic abdomen, urgent pain of various parts, particularly under the left mamma, and the production of the disorder by some mental excitement—soon disclose its true nature. The mistake is, however, too often committed, and is of serious consequence, since injudicious depletion aggravates all the symptoms, and may even produce permanent mania, whilst it always retards, and sometimes prevents, ultimate recovery. On the other hand the application of cold to the head, the use of mild anodynes, such as camphor with extract of henbane, or, if they fail, morphia, with perfect quietness, soon dispose

to rest; after which the nitrate of silver, in half-grain doses, exerts a most favourable influence on the morbid sensibility. Should the debility continue long, and the symptoms assume an intermittent character, the sulphate of quinine will be found a valuable auxiliary; or if there be pallor, with neuralgic symptoms, the sesquioxide of iron. Some of the chalybeate mineral waters, as the Eger, Pyrmont, or Spa, and exercise in dry country air, will materially promote the recovery of strength. The use of the shower bath is an important auxiliary to the tonic plan, its influence on the cutaneous nerves producing a most favourable effect on the nervous centre.

Secondary or sympathetic hysteria is generally associated with derangement of the intestines or the uterus, to which parts it will therefore be necessary to direct the chief attention. We cannot be surprised that impressions made on the delicate extensive plexuses of the intestines should powerfully affect the nervous centre. A striking example of the power of such impressions in producing hysterical symptoms is given by Brachet. On two different occasions, at intervals of nine months, a woman, who had never before exhibited any phenomena of the disease, took food which, without her knowledge, contained cheese, and each time fell into an hysterical paroxysm, which was relieved only by vomiting. The symptoms exhibited, and the treatment required, in hysteria from intestinal derangement, vary according to the peculiar nature of that derangement. For practical purposes it will be sufficient to consider it as associated with *intestinal irritation*, or with *intestinal torpor*.

The first class of cases, those arising from intestinal irritation, often partake of an inflammatory character; the abdomen is distended and rather tender; pain is felt after taking food, especially when of an indigestible kind; the tongue presents large red papillæ, and there is much thirst. Eruptions arise on the skin from slight causes; sleep is much disturbed: any indigestible substance detained in the stomach, such as cheese or potato, will occasionally produce terrific palpitation of the heart. Intense gastrodynia occurring in paroxysms, particularly in the morning, is not uncommon. The hysterical phenomena attending this condition are exceedingly irregular. Perhaps the most usual indications are attacks of violent headach, strong and variable emotions, and a disposition to laughter, or excessive weeping on slight occasions. In these cases if the tenderness of stomach be considerable, leeches are in the first instance necessary; afterwards great benefit is derived from cooling saline medicines combined with hydrocyanic acid. If there be much flatulence, and especially if the urine (which is very common) appears muddy, a few drops of Sp. Ether Nitr. may be added to each dose with advantage. The catamenia are apt, in these cases, to be profuse, and accompanied with much pain of back and head. These symptoms are materially relieved by rest, and small doses of Liquor Ammon. Acet. Aloetic and all irritating purgatives must be carefully avoided. Castor oil is almost the only aperient which can be borne. When the paroxysms of palpitation and flatulent colic are urgent, the assafoetida enema will often give relief. Morphia sprinkled on a blistered surface, applied to the præcordial region, will often quiet the heart, and soothe the stomach. Stimulants of every kind should, as far as possible, be avoided, since the temporary relief afforded by them does not compensate for the prolonged suffering which the subinflammatory state of the digestive organs, thereby induced, is calculated to occasion. The diet must be regulated with great care. In the attacks of gastrodynia which occasionally attend or follow the condition just described, we have found great benefit from the use of small doses of sulphate and sesquicarbonate of soda combined with an aromatic.

In some instances there is no evidence of general irritation; the tongue is perhaps pale. The symptoms are almost limited to the stomach, which rejects food; and the occasional occurrence of globus is the chief indication of hysteria. The epigastrium may be tender, but the feeling after taking food is one of oppression rather than of pain. In these cases hydrocyanic acid is a remedy of great value, but is better combined with mucilaginous mixture than with

salines. A few leeches, followed by counter-irritation, and a strict adherence for a time to farinaceous diet, shortly change the character of the complaint. The sickness attending this state of stomach, when not removed by prussic acid, is sometimes curable by creosote, but the remedy is too stimulating for indiscriminate use, and the nitrate of silver would often be preferable.

Globus, palpitation, and the hysterical condition of mind, are occasionally accompanied by hæmorrhoids. In these cases hepatic congestion is generally present. The mercurial pill in half-grain doses, continued for some time, is useful; and if paroxysms of flatulent colic occur, a combination of valerian and opium.

2. Hysteria associated with intestinal torpor is generally observed in those who lead a sedentary life, and whose constitution is by no means delicate. A constipated state of bowels is well-known to disturb the functions of other parts, to weaken the organic energy, and to predispose to hysteria, which, when combined with this state, generally assumes the regular form. Here it is obvious that a judicious purgative plan is strongly indicated; and an emetic of ipecacuanha will frequently prevent a threatened paroxysm. This variety is usually complicated with amenorrhœa, and the remarks made under that complication will bear more or less application to the present one.

The second leading division of the *sympathetic* disease is that connected with *uterine derangement*, and in a practical point of view there are three important conditions with which it may be associated, namely, menorrhagia, defective menstruation, and leucorrhœa.

1. Hysteria accompanied with menorrhagia is particularly apt to occur in those who have had frequent miscarriages. When there is reason to believe that the complaint is passive, and that the hysterical affection is dependent on the debility thus induced, it is necessary to check the discharge by means of sulphuric acid or alum. The acetate of lead may perhaps have a more decided effect, but we have observed a greater tendency to colic from its use in hysterical persons than in others. If there is general or local irritation, sulphate of magnesia dissolved in infusion of roses will be useful; and during the catamenial period, cooling saline medicines, especially the acetate of ammonia, should be employed. Dry air, rest, and freedom from excitement, are essential to the cure.

2. When hysteria is associated with defective menstruation, some of its most decided and prominent features are presented; and this variety of the disease has therefore attracted peculiar notice. Tate has even restricted the term hysteria to this class. The catamenial secretion is scanty, irregular, or unnatural in appearance. The patient does not generally complain of pain in the back, but on examination the spine is almost always found tender, especially near the six upper dorsal vertebræ, with headach, aching of the loins and legs, and pain under the left breast. The bowels are commonly confined, the tongue is furred, and the pulse variable. Stupor, palpitation of the heart, and suspended respiration, are occasional phenomena. Hysteria thus associated usually exhibits a remarkable influence on the motor system of nerves. The paroxysm is decidedly convulsive, and contractions of the limbs may occur, especially at the catamenial period. Cases of hysterical catalepsy, chorea, and paralysis, are generally referrible to this division.

In the *treatment* of this variety the restoration of the catamenial secretion to its natural state is important, but not alone sufficient to effect recovery, since, especially when this depraved catamenial condition has been produced by mental causes, the attendant hysteria will often remain after the uterine function is reestablished. Unless the patient is very delicate, cupping or leeching the tender part of the spine will be expedient, and in some cases bleeding is necessary. Subsequently counter-irritation by means of antimonial ointment, and active purgatives, with which, if the face be pale and the circulation languid, iron may be combined, constitute the leading points of treatment. When the catamenial period approaches, especially if indicated by pain of back, headach,

and general uneasiness, a few leeches to the labia or thighs, and the mustard pediluvium, will promote its occurrence. A single dose of calomel, digitalis, and aloes, followed by an active aperient, as recommended by Dr. A. T. Thomson, and subsequently the use of pills of aloes and myrrh with galbanum, once or twice daily, powerfully contribute to reestablish the uterine action. The transmission of electrical shocks through the pelvis has considerable efficacy in correcting flatulence, promoting alvine evacuation, and exciting the catamenial function. During convalescence, active exercise and the use of the shower bath are requisite, and the general principles of treatment which have been repeatedly proposed must be duly observed.

3. The last variety of sympathetic hysteria, namely, that associated with leucorrhœa, or depending on chronic uterine irritation, is one of great importance, owing to its frequent occurrence and its liability to be overlooked. The sufferer complains of debility, her movements are languid and her spirits depressed, and she weeps on slight occasions, but makes no specific complaint. The appetite is bad, and the tongue is often fissured, the clefts being filled with a viscid secretion. Globus hystericus occurs from time to time, with tenderness of loins and sacrum, pain under the left mamma, neuralgic affections in the region of the stomach, along the margin of the ribs, on the right side, or throughout the abdomen generally, and often a flatulent state of the bowels, especially of the colon. The usual causes are, active exertion during the catamenial period, mental anxiety, or undue excitement, sometimes incidental to matrimony. In these chronic uterine affections the urine generally deposits the triple phosphates, while in the more acute and regular forms it is watery and contains little urea.

The *treatment* which we have found most effectual is a dose of mercurial pill and extract of hemlock, followed by castor oil with tincture of henbane, and afterwards saline medicines combined with prussic acid, tincture of henbane, and spirit of nitric ether. The frequent use of mercury, even in small doses, is to be deprecated, as it increases the irritability of the system; but an occasional dose relieves congestion and improves the secretions. After a time astringent lotions may be used, such as the Liq. Aluminis Comp. Sexual excitement must be avoided, and every measure employed which is calculated to strengthen without stimulating. The use of tonics must not be rashly or hastily adopted. Chalybeates are generally too exciting, and even quinine cannot always be borne. The sulphate of zinc is occasionally useful; and in some instances, especially when there is a catamenial deficiency, the artificial Kissingen water, prepared at the German Spa at Brighton, is of remarkable service in relieving from the sensation of weight after food, correcting the tendency to flatulent colic, and regulating the uterine function. It removes local congestion, especially of the uterus, and is peculiarly adapted to derangement of this organ associated with fibrinous catamenia. The affection of abdomen attending this form of the malady sometimes greatly resembles peritonitis, but superficial is as painful as firm pressure. The countenance is less anxious and distressed than in peritonitis, and the variable and diffused character of hysteria is easily recognised. Sometimes, however, there is sufficient uterine inflammation associated with this state to authorise a single bleeding, though the effect must be carefully watched, and undue depletion avoided.

Most of the neuralgic affections which we have seen associated with hysteria have been on the left side. For the relief of pain under the left mamma, between the cartilages of the fifth, sixth, and seventh ribs, and which appears to be of this character, Mr. Tate and Dr. O'Beirne place great dependence on tartar emetic ointment rubbed over that portion of the spine which supplies this part with nerves, and Dr. Copland has found benefit from the moistened inner bark of mezereon worn for some time, so as to produce a superficial sore. The sesquioxide of iron is often serviceable after the other symptoms of irritation have subsided, but its efficacy is much promoted, in many cases, by the previous application of leeches. The painful affection of the abdomen

may sometimes be relieved by a warm flannel dipped in spirits of turpentine. A careful observer cannot mistake for hepatic disease, the shifting and uncertain pain in the right hypochondrium which often attends this variety of hysterical complaint. When neuralgia of the uterus itself is present, according to Lisfranc, the cervix is tender, and possesses the form and size characteristic of the second month of pregnancy.

Hysterical affections of the joints, which have been so well-described by Sir Benjamin Brodie, are frequently but not invariably associated with the same variety. In some cases those of the knee so closely resemble in the symptoms ulceration of the cartilages, that it requires much time and care to form a correct diagnosis; but in hysterical affections the limb is often extended, whereas in diseases of the cartilages it is usually bent: in addition to which, the previous history of the case will frequently solve the problem. In these cases blistering is in general useless, and confinement injurious. The belladonna plaster is less useful in this than in other forms of hysterical neuralgia. Sir Benjamin Brodie has found the pain palliated by a tepid lotion, consisting of equal parts of Sp. Rosmarini and Mistura Camphoræ; and when the limb is liable to alternate heat and cold, by a cold spirituous lotion during the hot fit, and during the cold one by a worsted stocking covered with oiled silk, so as to confine the heat and perspiration. The intermittent character of the symptoms indicates the administration of the sulphate of quinine.

Marriage has been by some authors recommended as a remedy for hysteria; but the preceding remarks will show that it is quite as likely to aggravate the complaint as to cure it: and where it does prove a remedy, it is probably rather by satisfying the affections of the heart.

Hysteria frequently occurs in persons of a gouty constitution, by which it is somewhat modified; and in these cases colchicum merits a trial.

Those who have long suffered from hysterical complaints, have frequently a tedious convalescence, with various distressing affections of the stomach, nerves, mind, &c.; but provided the recovery is progressive, it is better not to interfere too actively. Exercise, country air, and useful occupations, gradually restore the health; and in the absence of any distinct indications of treatment, the advice of Sydenham is peculiarly valuable, "If you cannot do good, do nothing."

In the *moral management* of hysteria it is important to temper kindness with firmness, and to avoid a parade of sympathy. A due intercourse with society, which diverts without exciting, is desirable. It is of great importance to remember that hysterical susceptibility is perhaps, in a majority of instances, the result of injudicious management in early life. The many excellent works published of late years on the subject of physical education, are already attracting deserved attention and contributing to correct this evil; nevertheless, in the upper ranks of society, young females are still pampered with stimulating food, and injured by modes of dress which unduly compress the most important viscera. Too much time is still devoted to sedentary employments, and the perusal of works of fiction is too often substituted for solid attainments, by which a fondness for injurious excitements is naturally promoted, instead of a salutary habit of self-control. It was never intended by Providence that every woman should be a musician or a painter, but it was undoubtedly designed that she should cultivate those substantial qualities of sense and temper which give permanence and freshness to the charms of domestic life. During early youth, the mind must not be allowed to outstrip the body; exercise and fresh air strengthen both, and in favourable weather the house should often be regarded rather as a retreat than as a dwelling-place.

TETANUS.

Explanation of the term tetanus and its varieties.—*Trismus.*—*Opisthotonos.*—*Emprosthotonos.*—*Pleurosthotonos.*—*Trismus nascentium.*—*General and local.*—*Acute and chronic.*—*Idiopathic and symptomatic.*—*Continued and periodic.*—*Premonitory symptoms of tetanus.*—*Symptoms of the paroxysm of trismus*—*of opisthotonos*—*of emprosthotonos*—*of pleurosthotonos.*—*Chronic forms of tetanus.*—*Predisposing causes.*—*Exciting causes.*—*Anatomical characters.*—*Nature.*—*Diagnosis.*—*Prognosis.*—*Treatment.*

THIS term (derived from *τείνω*, to stretch) denotes a disease, the principal characteristic of which is tonic spasm of a certain number of muscles. Some authors have restricted its meaning to that form in which, by the muscular spasm, the trunk is kept perfectly straight, and employ other terms to designate the disease when any particular set of muscles are more especially affected. Thus, if the muscles which raise the lower jaw be in a state of contraction, it has been denominated *trismus* (from *τρίβω*, to gnash); if those attached posteriorly to the spine be affected, so as to draw the body backwards, *opisthotonos* (from *ὀπισθεν*, backwards); if the muscles of the neck and abdomen be contracted anteriorly, in such a manner that the trunk is inclined forwards, *emprosthotonos* (from *ἐμπροσθεν*, forwards); and if the muscles are affected laterally, so that the body is curved sideways, *pleurosthotonos* (from *πλευρόσθεν*, sideways). In all these forms, however, the disease is essentially the same, and at present the above terms are only used to express the distortion or particular posture produced. When it occurs in infants it is called *trismus nascentium*. Some writers divide tetanus into *general*, when the whole muscular system is affected; and *local*, when there is rigidity of one or several muscles, as in cramp, priapism, &c. Tetanus has also been distinguished, as regards its duration, into *acute* and *chronic*, though the limits where the one terminates, and the other begins, have not been fixed. Two varieties have also been established, the *idiopathic* and the *symptomatic*; the former arising from causes acting directly on the nervous system, the latter from the irritation in other organs being propagated indirectly to the nervous centres. Thus tetanus following wounds (termed *traumatic*) belongs to the latter variety. It has also been divided into the *continued* and *periodic*: in the former the rigidity does not disappear entirely, but the symptoms sometimes suddenly increase; in the latter there are complete intervals or interruptions of the tetanic rigidity,—the symptoms in some cases recurring at stated or fixed periods. The *continued* forms are always acute or subacute, the *periodic* always chronic. Dance has recorded four cases of the latter variety. (*Dict. de Méd. et Chir. Prat.*) Hufeland has also seen a case that for years returned at regular periods, which lasted eight hours. (*Manuel de Méd. Prat. par Jourdan*, p. 234.)

Symptoms. The symptoms of tetanus vary according to the severity and duration of the disease, and the particular set of muscles affected. It sometimes comes on suddenly, without any signs to indicate its approach. In general, however, one or more of the following premonitory symptoms have been observed, viz. sadness; languor; unusual melancholy and depression; unwillingness to speak or move; restlessness or uneasiness; watchfulness; headach; yawning; loss of appetite; bitter taste in the mouth; foul tongue; constipation; unpleasant sensation about the præcordia; pains in the back; a dry tumid skin; unusual extension of the limbs during sleep, and sometimes a strange sensation of terror. According to Larrey, traumatic tetanus is announced by deep pains in the wounded part, extending to the spine, and in some cases twitchings of the limb have been observed to precede the attack.

The above symptoms are, however, common to many disorders; but in

chronic cases of an epileptic character, where a distinct interval more or less prolonged takes place between the paroxysms, one or more of the above signs indicate with tolerable certainty an approaching attack.

The tetanic symptoms may be said to commence with a feeling of stiffness in the muscles of the jaws, throat, or neck, attended with difficulty of swallowing. There is a constraint in flexing or rotating the head, and in opening the jaws. In general this latter symptom, or the trismus, comes on gradually, accompanied with uneasiness or pain in the muscles affected, when the inferior maxilla is by degrees drawn against the superior, and at length so firmly closed that it is impossible to separate them. Sometimes, however, this occurs suddenly, and the jaws are violently snapped together, and remain firmly clenched. Violent and acute pain is now felt below the sternum, sometimes of a darting or stabbing character, extending to the spine, or there is a sense of traction or constriction in this situation. If the rigidity extend to the muscles of the trunk and extremities, the complete paroxysm is manifested. At this time the face is sometimes pale, but usually flushed, the veins being full and prominent: the brows are contracted; the skin covering the forehead corrugated; the eyes fixed and prominent, sometimes suffused with tears; the pupils stationary, generally contracted, but sometimes dilated; the alæ of the nose elevated, and the nostrils expanded; the angles of the mouth drawn outwards and upwards, sometimes downwards, so as to produce the most frightful *risus sardonius*; the tongue fixed and immovable, and the whole countenance expresses the greatest pain and anxiety. Sometimes a frothy saliva is squeezed out between the teeth, and flows from the mouth; in other cases the tongue is thrust forwards and lacerated, giving rise to considerable hæmorrhage. The larynx is raised; the articulation indistinct and painful; sometimes the power of articulation is lost, all attempts to speak apparently aggravating the paroxysm. The muscles generally are tense, rigid, and often feel as hard as a board; the shoulders are drawn forwards, and the trunk and extremities firmly fixed in various positions, afterwards to be described, or violently thrown about by occasional momentary relaxations, followed by sudden muscular contractions of longer or shorter continuance. The respiration is hurried, and performed with great difficulty and anguish, presenting to the spectator one of the most distressing forms of dyspnœa. The patient often feels great thirst, but all attempts at swallowing produce extreme agony, and spasms of the muscles of deglutition; symptoms allied to those of hydrophobia being thus occasionally produced. The pulse at the commencement is full and hard, but gradually becomes feeble and frequent, sometimes intermittent or irregular, according to the continuance and severity of the attack. The temperature of the skin is increased, and the surface covered with a profuse perspiration, which in certain instances is confined to the face and chest. Occasionally the urine is expelled with violence, but sometimes there is retention. The sphincter ani in general is firmly closed, but in some cases the fæces have been expelled involuntarily. In the midst of all these sufferings the intelligence is unaffected,—a circumstance which increases the distress with which the bystander must naturally regard them.

Such are the general symptoms which characterise the paroxysm in its severe acute form; but there is considerable variation, according to the peculiar class of muscles more especially affected. When the disease is confined to the levators of the lower jaw, constituting *trismus*, some time may elapse before other muscles become affected; in this state the malady may disappear, or it may prove fatal. When the disorder, however, is more severe or advanced, trismus supervenes, which may be considered only as a mild or partial form of the general disease. *Opisthotonos* is occasioned by the posterior muscles of the spine being powerfully contracted, the effect of which is to draw back either the head and neck alone, or to curve the trunk into the form of an arch, the body resting only on the occiput and sacrum, or on the vertex of the head and heels, if the lower extremities be affected. The force and suddenness with which this is produced, is sometimes sufficient to throw the patient out of bed.

Fournier Pescay has seen dislocation of the second cervical vertebræ, and Desportes, fracture of the thigh bones from the excessive muscular action. Larrey and Curling also relate cases in which one of the *recto-abdominalis* muscles was ruptured. *Emprosthotonos* is produced by the muscles on the anterior part of the body being most powerfully contracted, so that the head is flexed upon the breast, the thighs on the abdomen, and the trunk curved forwards. In severe cases the head and knees approach each other, the arms are flexed, and the hands sometimes clasped together. According to Larrey the legs are rigid and flexed upon the thighs, but Aretæus describes them as being extended. *Emprosthotonos*, however, is a very rare form of tetanus, and it is to the experience of Larrey in modern times we are chiefly indebted for its description. In *pleurosthotonos*, the neck and trunk is curved towards one side : this form is so rare, that some writers have doubted its existence.

Occasionally the whole body is perfectly rigid and straight, no particular set of muscles apparently being more affected than another. To this state some physicians consider the term *tetanus* ought to be restricted.

The dreadful symptoms described may terminate in death, or they may gradually cease, and the patient return to his natural condition, or to a comparative state of ease. In the former case the various symptoms increase in intensity : the dyspnœa becomes more urgent ; an agonising sense of suffocation is felt ; the perspiration becomes cold and clammy ; the pulse thready or imperceptible ; a frothy, bloody mucus escapes abundantly from the mouth ; the countenance assumes a livid hue ; the spasms increase in frequency, and are renewed by the slightest attempt to move or swallow, or by any trivial circumstance, such as opening the door, a draught of air, &c. ; delirium sometimes supervenes, and the patient sinks either asphyxiated or exhausted from the efforts and pain of the paroxysm. Sometimes the individual dies suddenly after an amelioration of the symptoms. When the disease terminates favourably, the rigidity gradually lessens, the spasms are less frequent, the respiration becomes more free, and the pulse natural ; and although there is for some time a feeling of stiffness or soreness in the muscles, the patient gradually returns to the state in which he was before the seizure. The duration of acute tetanus varies. A case is recorded of a negro, who, having scratched his hand with a piece of broken plate, died of tetanus in a quarter of an hour. (*Rees's Cyc.*, art. TETANUS.) The fatal termination usually takes place from the fourth to the eighth day, but cases have been reported which continued to the fourteenth and even to the twentieth day. (*Morgagni*.) On the other hand the recovery is generally slow. Of 58 cases collected by Curling, which terminated successfully, 8 recovered in a week ; 3, in 10 days ; 4, in a fortnight ; 4, in 3 weeks ; 15, in a month ; 4, in 5 weeks ; 8, in 6 weeks ; 3, in 8 weeks ; 3, in 2 months ; and 2, so late as 3 months. Greater or less rigidity of certain muscles may remain for many months, and in some cases a peculiarly aged character is given to the countenance.

The chronic form of tetanus is characterised by the same symptoms, but they come on more gradually, and there are sometimes shorter or longer intervals between the paroxysms for several months or even years. There does not seem to be any very clear division between the acute and chronic forms. Dr. Symonds thinks a subacute form should be constituted, including those cases which are of mild character, but which do not continue long enough to be designated chronic. But however we multiply the divisions, intermediate cases will always be found, which no arbitrary classification can comprehend.

Many of the symptoms are liable to various modifications in particular cases, or at different periods of the disorder. The muscular system, as we have stated, may be so affected as to produce trismus, opisthotonos, emprosthotonos, or pleurosthotonos. Cramp also is a slight modification of the disease, and during the paroxysm all the muscles are more or less spasmodically affected. The contraction of the pectorals draw the shoulders forward, and the rigidity of the respiratory muscles prevent the free motion of the chest. In trismus, although

the jaw is closed, the anterior muscles of the neck appear hard and contracted, and in opisthotonos the walls of the abdomen are stretched, and feel as hard as a board, showing that the peculiar distortion produced is not the effect of a particular set of muscles only being affected, but that their power is increased, or that they are acted on to a greater degree than others. The muscles of deglutition are peculiarly liable to be excited on the slightest contact, producing inability or difficulty of swallowing, and in severe cases horror of fluids, and symptoms resembling those of hydrophobia. In some instances it has been observed that the cremasters participate in the disease and draw up the testes. The eyeball is always fixed, and sometimes from irregular action of its muscles drawn inwards. During sleep the muscles are relaxed, and it has been observed in many cases that, during the whole course of the disease, those of the fingers have not been affected. The voluntary muscles principally suffer, though several authors are of opinion that the involuntary are also occasionally affected. It must be evident however that tetanic spasm of the heart, diaphragm, &c., must soon be followed by death; and although certain symptoms indicate that they are in some way or other acted on, the manner in which they are affected is unknown.

The sensibility to touch is not increased in tetanus, but in many cases the slightest contact, or even noise, is sufficient during the remission to bring on the spasms. The pain experienced in particular muscles is sometimes very great, especially in those which have been injured by a wound. In a case however given by Sir G. Blane (*Obs. on Diseases of Seamen*) a pleasurable tingling sensation was experienced. In almost every instance of tetanus, great pain is felt in the præcordial region or below the sternum, which has been denominated by Dr. Chalmers the pathognomonic symptom of tetanus. It is described as being of a dragging nature, occurring suddenly, and darting towards the back, and not increased by pressure. In some cases it appears early in the disease; in others at a later period, and is attributed to the diaphragm partaking in the general spasm.

The intelligence is in the great majority of cases clear and unchanged. Some instances are recorded however (and we have seen a remarkable one of this kind), in which the consciousness was completely lost. Under such circumstances the disease may be called epileptiform.

The pulse in tetanus varies according to the stage of the disease. Morrison, Hennen, Macgregor, and others, have noticed that it was not much affected. In the early stage there is no remarkable acceleration; but during the spasms, it is somewhat quickened; and as the disease approaches its fatal termination, it becomes weak, frequent, and thready. Dr. Parry thought that the patient was safe if the pulse did not exceed 110 beats on the fourth or fifth day. No dependence however can be placed on this symptom as a prognostic, many cases having died when the pulse was more slow, while others have recovered when it was more frequent. The temperature of the surface is generally increased, and sometimes the skin feels hot. M. Prevost of Geneva had a case in whom the temperature at the axilla was 110° (Fahrenheit), and Dr. Bright another, in whom it was 105°. The cutaneous transpiration is increased, which may be attributed to the violent muscular exertion into which the patient is involuntarily thrown. Sometimes there is a slight miliary eruption. There is occasionally fever, more commonly in idiopathic cases, but sometimes also when it arises from wounds: many writers however, who have seen much of the disease, have never observed this. The tongue is moist at the commencement, but becomes dry as the disease proceeds. Constipation is almost a uniform symptom in tetanus: this has been attributed to many causes, as spasm of the muscular coat of the intestines, excessive cutaneous transpiration, pressure of the diaphragm and abdominal muscles, loss of the voluntary power necessary for defæcation, the use of opium, and other constipating remedies, &c. Retention of urine occurs occasionally, and in such cases there is much difficulty in introducing a catheter, from the spasmodic action of

the muscles at the neck of the bladder. The urine is generally high-coloured and scanty.

Causes. Men are more liable to tetanus than females, a circumstance which is accounted for by the former being more exposed to the exciting causes of the disease. Tetanus is common in early infancy; the term *trismus nascentium* has been given to the disease, when it occurs at this epoch of life. After this period, however, it occurs most frequently between the ages of ten and fifty. Extensive observation has shown that it is very rare in advanced life, although Aretæus thought it readily developed in old persons.

It is a well-established fact, that notwithstanding tetanus may occur in all climates, it is most common in those of an elevated temperature, and more frequent when the season is hottest. Army and navy surgeons, who have practised in the East and West Indies, have proved this, although we possess no statistics which enable us to speak decidedly as to its proportionate frequency. Moist situations also predispose to the disease. In the French hospitals at Cairo, which were erected on ground subject to the periodic inundation of the Nile, it was very frequent. It is said also to be more common in marshy situations and countries bordering upon the sea, than in dry and elevated places far from the coast.

The strong, robust, and athletic, have been noticed as being more liable to the disease than weak persons, or those in ill health. It is also more common in individuals of a nervous, than in those of a lymphatic temperament. Campet, Dazille, and Anderson, have noticed that tetanus is much more common among the negroes than among the white population, a circumstance which has by some been imputed to an inherent predisposition, and by others to their more frequent exposure to the exciting causes. Insufficient nutriment, close and ill-ventilated habitations, uncleanness, and neglect of the bowels, powerfully predispose to this disease. Drs. M'Arthur and Dickson have shown, that since these evils have been remedied, a marked diminution in the frequency of the disorder has occurred in the West India department of the navy.

The most frequent *exciting* causes of tetanus are external injuries, and it appears that the most unimportant superficial abrasion, and the most serious operation, may give rise to the disease. It has been occasioned by a bite on the finger from a tame sparrow (*Morgagni*); the stroke of a whip lash under the eye, although the skin was not broken (Reid, *on Tetanus and Hydrophobia*); a fish bone sticking in the pharynx (Larrey, *Mém. Chir. Mil.*, tom. i. p. 254.); a seton in the chest (Andral, *Clin. Méd.*, tom. iv. p. 445.); the stroke of a cane on the neck and hand (Morgan, *on Tetanus*, p. 6.); flagellation; extraction of a tooth (*Edin. Med. and Surg. Journ.*, vol. xv.); cupping; venesection, &c. It has also followed severe fractures, lacerations, contusions, punctures, amputations, excision of the mamma, tying arteries, gun-shot wounds, castration, injection for hydrocele, &c. An instance is related where it followed the bite of a horse in the arm (*Boyer*, tom. i. p. 287.), and another in which it was occasioned by stretching a nerve. (Swan, *on the Nerves*, p. 541.) A wound in any part of the body may produce tetanus, although it has been observed more frequently from injuries of the extremities, than from similar injuries of the head or trunk. In 128 cases of traumatic tetanus, collected by Mr. Curling (*Essay on Tetanus*), the wounds occurred on some part of the lower extremities in 64, and on the upper extremities in 46, and of these the feet and toes were the seat of injury in 35, and the hands and fingers in 34. Dr. Hennen observed it most frequently after wounds of the elbow and knee, and others when the thumb or great toe was injured.

Some authors have noticed a peculiar state of the wounds in connexion with tetanus. Rush remarked that they were always free from inflammation (*Med. Inquiries*, vol. i.); Larrey, that they were either dry, or covered with a thin serous exudation; and Fournier Pescay describes them as being pale, livid, sometimes covered with an ichorous secretion. (*Dict. des Sc. Méd.*, tom. lv.) Sir J. Macgregor and Dr. Hennen however, after great experience in this disease,

conclude that there is no relation between the state of the wound and the occurrence of tetanus. They have seen it occasioned by all descriptions of sores, healthy and sloughing, incised and lacerated, simple and complicated. Neither does its accession produce any alteration in the wound, or retard its progress towards a cure; and in many cases it has been completely healed and forgotten before the occurrence of the tetanic symptoms. Dr. Elliotson observes that the disease has sometimes declined and ceased, while the wound every day grew worse and worse.

The interval between the infliction of the injury and the commencement of tetanus differs considerably. In a case related by Dr. Robison (*Rees's Cyc.*, art. TETANUS) it followed immediately; the longest period on record is ten weeks: the case is detailed by Mr. Ward. (*Facts establishing the Efficacy of Opiate Friction in Spasmodic and Febrile Diseases, &c.*, 1809.) In the 128 cases of traumatic tetanus collected by Mr. Curling, it appeared from the fourth to the fourteenth day in 81, and this is the most common period of its occurrence. The time after which an individual may be considered safe from tetanus when he has received an injury, is undecided, and has been differently stated by authors. Fournier Pescay says he has seen it occur after a month. Sir J. Macgregor never witnessed an interval longer than twenty-two days, and Sir B. Brodie longer than seventeen. Larrey thought that in Egypt the French soldiers were safe after the sixteenth day.

Exposure to cold and damp is a frequent exciting cause of tetanus, independent of any other circumstance. Numerous cases are related of individuals being affected after sleeping during the night in the open air, particularly in tropical climates, where the dew is abundant, and the nights cold. Hennen and Larrey have noticed its occurrence in Egypt, when the nights were chilly and rainy, and when the troops were exposed to cold and moist breezes from the sea. Sudden changes of temperature have in like manner been noticed by the last-named authors, and by Dazille, Campet, and Rush. The latter writer informs us, that while no case occurred among the soldiers who had passed a winter in Rhodes Island in 1781, it was frequent in some troops newly arrived from the West Indies. Bégin states, that after the battle of Muskowa, although the heat was very intense, no cases of tetanus occurred; whereas, after the battle of Dresden, when moist and cold weather succeeded a great elevation of temperature, it was common. Dr. Chalmers gives a case where it was brought on by sudden change of weather in a man who slept without his night-cap. Going into the external air from the heated atmosphere of a ball-room has also occasioned it. Fournier Pescay gives two instances where it followed the action of cold water on the body when in a state of perspiration, and one where it arose from exposure to the north wind, when the individual laboured under fever.

Intestinal irritation has occasioned the disorder: the presence of worms is one of its most frequent causes. Laurent (*Mém. Chir. sur le Tétanos*, 1797) considered this almost the only cause of the disease; and in addition to the cases he has related, others have been recorded by Morgagni, Stoll, Fournier Pescay, O'Beirne, and others, where tetanus was apparently produced by vermination. It may also be occasioned by any other disorder of the digestive organs arising from improper food, irritating substances in the stomach or intestines, indurated fæces, &c. In infants an acrimonious state or retention of the meconium is a frequent cause, as well as irritation produced by the milk of the nurse.

Among the other exciting causes of tetanus have been observed great fatigue; terror; mental anguish; abortion; suppressed perspiration; cessation of the lochia, and other habitual discharges; intoxication; variola, typhus fever, gastric inflammation, and other acute diseases; retrocession of cutaneous disorders; lacerations and ulceration of the navel string; difficult and painful dentition; ulceration of the gums; irritation from the appearance of the dens sapientiæ; insolation; indigestion; constipation; rheumatism; hysteria; large doses of strychnine, nux vomica, &c.

It should be observed, that in many cases it is extremely difficult to determine the exciting cause, inasmuch as one or more of those we have enumerated may exist in the same individual, and in some instances the disease may probably be occasioned by their conjoined effect. Thus it has been noticed by almost every writer that tetanus is more frequent when individuals suffering from external injuries are also exposed to cold moist weather, or to sudden changes of temperature. The occurrence of fear and mental anguish under the same circumstances has often been thought by Hennen to occasion it. We can also readily understand that intestinal irritation or other causes may prove exciting causes, and that it may be attributed to an accidental scratch received before the accession of the symptoms. Hence many of those cases which are reported to have followed wounds several weeks after they have been received may have arisen from other causes of irritation, connected with the internal organs; and, on the other hand, it is possible that the wound which occasioned the disease may be overlooked.

Anatomical Characters. The morbid appearances found in those who have died labouring under tetanus are very various. Not unfrequently no morbid lesion whatever can be discovered to which the symptoms can be referred. With a view to illustrate the pathology of the disease, we shall describe the morbid alterations that have been observed, 1. in the brain and its membranes; 2. in the spinal cord and its membranes; 3. in the nerves; and, 4. in other parts of the system.

1. Numerous cases have been reported in which the vascularity of the brain and its membranes was increased, the sinuses gorged with blood, the pia mater more or less injected, and the arachnoid cavity and ventricles more or less distended by serous effusion. These appearances have been occasionally observed by authors, who have had much opportunity of investigating the morbid anatomy of tetanus. Dr. Bright found an incysted abscess the size of a large nutmeg in the substance of the middle lobe of the brain (*Hospital Reports*, case 39.), and Bouillaud several tubercles, one of which was as large as an egg, in the right hemisphere (*sur l'Encephalite*). Generally speaking, the substance of the brain is found healthy.

2. Alterations in the spinal cord and its membranes are by far the most common appearances found after tetanus, and in such cases there have generally been traces of spinal meningitis. These instances are too numerous to be spoken of individually. Several have been recorded by Reid, Kennedy, Brayne, and others in Britain; Larrey, Broussais, Magendie, Recamier, Ollivier, and others, in France; Bergamaschi, Brera, Bellingeri, Uralli, Poggi, in Italy; and Frank, Funk, &c. in Germany. Thomson (*Phys. Obs. on the Typography*, &c. Philadelphia, 1818), and Göelis (*Salz. Méd. Chir Zeitung*, 1815), have observed the same appearances in infants who have died of trismus nascentium. In some cases the inflammatory appearances were more or less diffused over the spinal cord, and in others recorded by Ollivier, Pelletier, and Curling, they were limited to particular portions of it. Burserius found a large quantity of viscid yellow serum under the outer covering of the medulla spinalis. Ollivier discovered in the dorsal region of a child a red, consistent fluid in the cellular texture, between the dura mater of the cord and walls of the spinal column, with serous effusion within the membranes, and an albuminous concretion covering four inches of the medulla of the cord. Bellingeri gives a case where blood was effused in the cellular tissue, exterior to the dura mater. Poggi and Combette, in addition to evidence of spinal meningitis, have observed softening confined to the anterior columns of the cord. Bony and cartilaginous deposits have been occasionally found in the membranes covering the spinal marrow after tetanus. In some instances, on the other hand, no morbid appearances have been detected either in the cord or its membranes.

3. In traumatic tetanus, the nerves in the neighbourhood of the wound have often been found more or less injured, or to have undergone morbid alterations. In certain cases they have been contused, lacerated, partially divided, irritated

by spicula of bone, or other foreign substances included in ligatures placed on arteries, or participating in the inflammation of the surrounding textures. In the latter case, the appearances have differed according as the inflammatory action was acute or chronic; injection, more or less intense, and softening being evidence of the former, and thickening, induration, and discoloration of the latter. Lobstein (*De Nervi Sympathetici*, p. 152.), and Andral (*Clin. Méd.*, tom. i. p. 49.), have observed signs of inflammation or redness in the semilunar ganglion, and Swan (*Diseases of the Nerves*) has often seen the ganglia of the sympathetic system in general considerably injected—an appearance which has been occasionally observed by other authors.

4. Dupuytren found in an individual who died of opisthotonos the muscles gorged with blood and lacerated. Larrey and Curling give cases where one of the recti abdominis muscles was torn across. The pharynx and œsophagus were often seen by Larrey contracted, and their mucous membranes red, inflamed, and covered with a viscid reddish mucus. The large papillæ at the root of the tongue have occasionally been found thickened, and the mucous lining of the larynx injected and covered with frothy mucus. Andral gives a case where unequivocal marks of gastritis were discovered, and M'Arthur found in four cases inflammation of the alimentary canal, with a peculiar yellow matter covering the mucous membrane of the stomach and œsophagus, which in one case effervesced on being exposed to the external air. Worms have been discovered in the intestinal canal by Sauvages, Laurent, Larrey, O'Beirne, and others. The last writer states that distension of the cæcum and colon is a constant pathological appearance. In a case related by Mr. Howship the heart was much indurated, and presented considerable resistance to the knife.

Nature. Numerous theories have been advanced to explain the different phenomena observed in tetanus, but as none of them appear to have been deduced from a sufficiently extended series of observations, they have been rejected as inapplicable to the end in view. We are unacquainted with any series of facts which explain why in some cases there should be trismus alone, and in others opisthotonos or emprosthotonos, although in some few cases the increased vascularity of the spinal cord and its membranes have been circumscribed so as to involve more particularly the origin of those nerves which are distributed to the muscles especially acted on. These cases, however, are very rare, and observation has shown that in the majority of instances no such limited lesion can be discovered. That the motor portion of the fifth pair is morbidly stimulated in trismus, is highly probable, because we observe the muscles to which it is distributed are those principally affected. But the proximate cause producing the irritation is not always discovered after death. Larrey thought that emprosthotonos or opisthotonos was occasioned according as the wound injured the nerves on the anterior or posterior part of the body, and that if the nerves in both situations were wounded, complete tetanus was established. Numerous facts, however, prove that there is no relation between the situation of the wound and the form of the disease. Bellingeri has brought forward an elaborate theory which consists in attributing to the cerebral hemispheres the power of producing one kind of motion, and to the cerebellum that of producing another. He considers that the former presides over flexion and adduction, and the latter over extension and abduction. This is what he denominates "nervous antagonism," by which he thinks all motions throughout the body are governed. Thus, according to this author, opisthotonos or spasmodic extension depends on some irritation or disease of the cerebellum and posterior columns of the spinal cord; while in emprosthotonos or spasmodic flexion, the hemispheres and anterior spinal columns are more particularly affected. These views, though they have been maintained with great ingenuity, are not only opposed to the physiology of the nervous system established by Sir C. Bell, but to the majority of pathological facts with which we are acquainted.

It has been stated in the general observations, that irritation of any part of the nervous substance will increase the function dependent on the part irritated. In tetanus, the intelligence and general sensibility are unaffected, while the characteristic symptom of the disorder is referrible to an augmentation of motor influence. We are therefore led to conclude, that irritation of the *tractus motorius* is a pathological condition necessary for the production of tetanus. Partial pressure, it is well known, is capable of producing irritation, whether applied to the spinal cord alone, in the course, or to the extremities of a nerve, and we find that morbid alteration or injury of either has been known to induce tetanus. The present state of science, however, does not enable us to indicate what particular morbid lesion occasions this irritation, which, with a view to treatment, is a point of primary importance. When treating of spinal meningitis, we have seen that muscular rigidity is a diagnostic symptom of that disease, and the dissection of individuals who have died labouring under tetanus has shown, that a vascular state of the membranes of the cord is by far the most common morbid lesion discovered. In many cases, however, no appearance of inflammation or increased vascularity is to be discovered; and it has been thought by some, that these appearances are rather the effects than the cause of the disease. However we may speculate on this point, proofs are wanted to establish the correctness of either opinion; but as we know that congestion of the bloodvessels surrounding the cord will occasion partial pressure, and consequently irritation, although it may not leave any traces of its existence after death, it seems reasonable to suppose that such a state more frequently precedes than follows the tetanic spasms.

Pelletier and Bergamaschi attributed the disease to inflammation of the nerves of the part injured, extending to the spinal cord; and Mr. Swan having found the ganglia of the sympathetic system of nerves preternaturally injected, thinks that the various predisposing and exciting causes produced disorder of the digestive organs, which was communicated by the ganglionic nerves to the other parts of the nervous system. Either of these views are fully capable of explaining how in certain cases irritation may be induced in the spinal marrow; but observation does not warrant us in considering either one or the other the true cause of the disease. Indeed modern researches have not revealed to us what is the nature of the morbid lesion which gives rise to the irritation, and whether it be allied to inflammation or congestion is equally unknown.

It should be observed that tetanus rarely follows the infliction of a wound immediately, that its occurrence bears no relation to the severity or extent of the injury, and that it cannot be produced artificially, except by the administration of poisons containing strychnia or brucia. These facts lead to the inference that, besides the local injury, there is a peculiar state of the system hitherto unknown and unexplained, which favours the production of tetanus, inasmuch as mechanical irritation of the motor tract, or of a nerve, does not produce tonic spasm, but convulsion. We have also been satisfied from experiments on the frog, that strychnia acts through the medium of the circulation, and not by direct influence on the nerves to which they are applied. A similar conclusion has been arrived at by other experimentalists.

It appears therefore that the great point with regard to the pathology of tetanus, is to determine the essential distinction between tonic spasm and clonic convulsion, and the agents which induce the one or the other. The exciting causes which occasion the first, including wounds, the presence of worms, and other sources of irritation, much more frequently give rise to the second. To what are we to attribute the different result? No answer can be given to this question: it is evidently better therefore to abstain from hypothesis, acknowledge our ignorance of the subject, and recommend it as a subject of experimental investigation.

Diagnosis. Tetanus is readily distinguished from other maladies, by the continued muscular rigidity often suddenly increasing, the distortion of the countenance, and the peculiar pain at the *scrobiculus cordis*. It has been

sometimes closely simulated by hysteria; but the latter disorder is general in females, while tetanus, as has been shown, is most common in males. In hysteria also the globus hystericus, the absence of distortion of the face, and the dissimilar exciting causes, are sufficient to indicate the disease. We have stated that sometimes in tetanus there is difficulty of swallowing and horror of liquids. Hydrophobia, however, may be distinguished from these cases by the absence of continued rigidity, and the nature of the spasms which are clonic and of short duration. In general also there is great excitement, and a peculiar anxious expression of countenance very different from the distortion in tetanus. It is scarcely possible to confound this disease with any other.

It is of great importance to discriminate whether tetanus arises spontaneously, or is the effect of poisons containing strychnia. This, however, is very difficult, as the symptoms are identically the same. If the poison be taken internally, there may be signs of unusual irritation in the digestive organs. The sudden occurrence of the disease in its acute form, when the individual has not received any wound, or been exposed to cold and moisture or sudden changes of temperature, are circumstances that should excite suspicion, the truth of which can only be confirmed, during the life of the patient, by strong collateral evidence. Care should be taken to distinguish the trismus arising from local causes, as inflammatory affections about the face and throat, tumours at the base of the jaw, rheumatism of the temporal and masseter muscles, or the local inflammation arising from the administration of mercury.

Prognosis. The prognosis is more unfavourable in the traumatic than in the idiopathic form of tetanus. The danger must also depend on the violence and frequency of the spasms, and the extent to which the muscular system is affected. The great fatality of traumatic tetanus is spoken of by all who have had extensive opportunities of witnessing the disease. Sir J. Macgregor, who saw several hundred cases in the campaigns of Spain and Portugal, witnessed very few recoveries, and Dr. O'Beirne did not see a single recovery out of 200 cases which came under his observation. Hennen, Dickson, Morgan, and others also allude to the uniform fatality of the disease in its acute traumatic form. Several instances of cure however have been recorded. Sir G. Blane mentions that of twenty cases which occurred in the West Indies, after the action of April, 1782, three recovered. Of thirteen cases witnessed by Mr. Dickinson, surgeon at Grenada, four were cured, and many other instances are recorded by various authors.

The idiopathic form is not so dangerous as the acute, but the recoveries bear no proportion to the deaths. The trismus nascentium of infants is uniformly fatal.

The favourable circumstances are, a long interval between the occurrence of the exciting cause and the accession of the disorder; the slow progress of the disease, and the patient surviving beyond the fourth day; the muscular spasms not being general, frequent, or severe; the respiration easy, and the pulse natural.

The unfavourable symptoms are, quick accession; general spasms and rigidity; rapid progress of the affection; violent paroxysms occurring frequently; urgent dyspnœa; rapid, thready, and imperceptible pulse; inability to swallow; cold and clammy perspiration; livid countenance; delirium, &c.

Treatment. When our ignorance of the pathology of tetanus is taken into consideration, we need not feel surprised that the treatment has in the generality of cases been strictly empirical. Neither need we wonder that, while the most opposite remedies have been occasionally employed with apparent success, they have each in turn been rejected as unworthy of confidence. Not unfrequently several plans of treatment even opposed to each other have been employed in the same case, and such frequent changes made, that should the patient recover, it is impossible to determine which remedy has produced the beneficial result.

1. *Treatment of idiopathic tetanus* In idiopathic tetanus attention should

be paid to the constitution of the individual, and especially to the state of the vascular system, in order that the principles of treatment may be duly regulated.

As a general rule, if the pulse is full and hard, the system plethoric, the tongue foul and dry, the individual of a strong constitution, the skin hot, or other symptoms indicate increased vascular excitement, general or local bloodletting, or if the symptoms be urgent, both general and local bleeding, should be employed. This treatment is evidently indicated if there be pain in the back, or other symptoms of inflammation in the spinal cord or its membranes. At the same time acute purgatives should be administered in order to remove all sources of irritation from the alimentary canal, and repeated if necessary, so as to procure copious evacuations. These means will generally lessen the force of the spasms when tetanus is connected with increased vascular action, which is not uncommon in the idiopathic tetanus. If the spasms continue after these measures have been adopted, sedatives in full doses should be administered. The cold affusion or the cold bath has sometimes been beneficial. If, notwithstanding these means diligently employed and a restricted diet, the symptoms continue, and the disease become chronic, occasional cupping and counter-irritants on the spine should be employed; in short, a treatment adopted somewhat similar to that recommended for chronic spinal meningitis.

If however, at the commencement of the disease, the patient be feeble and of a weak constitution, or spare habit, with a quick and small pulse, pallid face, and evidence of diminished vascular action, a tonic and stimulating plan of treatment should be had recourse to, combined with sedatives, if the spasms be severe; a generous diet should be allowed, the bowels kept regular if necessary by purgatives with aromatics, and other remedies of a stimulating and tonic kind employed.

When the symptoms assume the form of trismus, a wedge of soft wood should be placed between the teeth, in order to prevent perfect closure of the jaws, and during the progress of the disease every kind of irritation that may occasion an increase or return of the spasms should be carefully guarded against. By adopting a method of treatment on the general principles laid down, we consider that the practitioner will best guard himself against the charge of empiricism, and by steadily pursuing it, will at the same time be most likely to overcome this formidable disease.

2. *Treatment of symptomatic Tetanus.* When we reflect on the numerous trivial injuries which the body may occasionally receive, and to which perhaps the attention is not drawn until the accession of the tetanic symptoms; when moreover the numerous sources of irritation that may exist in other organs, and more especially in the alimentary canal, are considered, it seems very probable that many cases which have been reported as idiopathic are only symptomatic of some disorder which has been entirely overlooked. Mr. Mitchell (*Med. Chir. Trans.*, vol. v. p. 25.) relates a case in which tetanic spasms of the tongue and muscles of the face were removed by abstracting some carious teeth, and he alludes to a similar instance, which occurred under the care of Dr. Thomas. We saw under the care of Dr. Graham, in the Royal Infirmary of Edinburgh, a man affected with opisthotonos of an epileptic form, there being loss of consciousness during the paroxysm. In the fit the whole body was powerfully drawn backwards, perfectly rigid, and formed an arch which rested only on the head and heels. Dr. Graham discovered that the dens sapientiæ on one side had not room enough to descend. The next tooth was extracted, and the spasms for a time entirely disappeared. We have since heard that the attacks returned, but that after undergoing a variety of treatment he recovered. Aware, therefore, that the disease may not only be occasioned, but in certain instances kept up, or rendered more severe by local irritation, the utmost pains should be taken to discover its source, and every effort employed, not only to obviate its effects, but remove its cause. If the suppression of the lochia, leucorrhœa, or other chronic discharges have preceded the attack,

we should endeavour to promote their return, or establish some artificial drain in the neighbourhood, while any disposition to plethora or increased vascular action should be combatted by local or general bloodletting. If there are any symptoms of worms, acute vermifuge remedies should be given both by the mouth and in clyster. A case of powerful trismus, with spasms of the face and abdominal muscles, is related by Dr. E. Phillips, which was relieved immediately by an injection of half an ounce of turpentine with yolk of egg. The following morning there was a copious stool, in which a worm was discovered, and the patient got well. (*Med. Chir. Trans.*, vol. vi. p. 65.) If the disease can be traced to checked perspiration, diaphoretics are indicated.

Wounds however are the most frequent cause of symptomatic tetanus, and should in all cases be carefully examined, with the object of ascertaining whether there be any foreign body, in order that it may be at once removed. Whenever the symptoms appear a short time after the reception of a wound, and there can be no doubt that the wound is the exciting cause of the disease, all nervous communication between it and the spinal marrow should be cut off as soon as possible. It is a singular fact, that this practice, which our knowledge of pathology and physiology shows to be necessary, and likely to be successful, has only (as far as medical records go) been performed four or five times, but in all these with perfect success. In a case related by Dr. Murray (*Trans. of Med. and Phys. Soc. of Calcutta*) occasioned by a wound in the left foot, the posterior tibial nerve was divided, and although the patient could not articulate distinctly before, from the closure of the jaws, he immediately opened his mouth with an exclamation, and expressed himself as being benefited. He rapidly recovered. Amputation has also been employed with varying success: surgeons however generally condemn this severe proceeding, except where the parts are much lacerated. Should the tetanic symptoms be advanced, it is inadmissible; and as the indication for which it is employed can be answered by dividing the nerves going to the injured part, it may appear extraordinary that it has ever been had recourse to. It should also be kept in mind, that the disease having been once called into action, often continues independently of its local origin. While therefore our attention is directed to the exciting cause, we must pursue the constitutional treatment on the principles already laid down.

The numerous remedies which have been recommended in the treatment of this disease have tended to produce great perplexity. Much however may possibly be attributed to the indiscriminate manner with which our most powerful medicines have been employed, and to the total absence of any principle in their administration. So far from considering our resources as insufficient, we consider they are fully capable of fulfilling all the indications, if used with perseverance and judgment. The sudden and astonishing cures that have been occasionally produced, when by accident a particular therapeutic remedy has been rightly administered, prove that our present want of success is not to be attributed to the inefficacy of the remedies employed, but to our ignorance of those symptoms in the patient which should direct their application. A few remarks, therefore, on the individual remedies that have been resorted to may not be inappropriate.

Bloodletting is indicated in those cases which are attended with increased vascular excitement, and whenever there are evidences of inflammation in the spinal cord or its membranes. Under such circumstances, it generally diminishes the force of the spasms. In a case where the pulse was full and strong, beating 140 in the minute, Mr. Earle repeatedly bled the patient, and there was remission of the spasms after every venesection. Wine and porter, however, were given to him by the friends, and he died. Vascular depletion has been carried to an extreme extent by some practitioners. From fourteen to fifteen pounds of blood were abstracted by M. Pelletier with success in a few days. (*Rév. Méd.*, 1827.) In one case which recovered, M. Lisfranc bled eight times, and applied 792 leeches over the spine.

(*Dict. de Méd. et Chir. Prat.*, art. TETANUS.) In a case of severe opisthotonos published by M. Larrey (*Mém. de Méd. et de Chir. Militaire*, tom. xxxiv.), in the acute stage, which lasted twelve days, he bled four times, and applied 120 leeches to the spine with a like result: M. Carron of Lyons has cured four out of five cases by the same means. In such cases as indicate bleeding, when the malady is acute, as often occurs in traumatic tetanus, venesection should be pushed to such an extent as to produce a marked effect on the system, while leeches are applied to the spine. Purgatives, opium, and other remedies, should be afterwards administered; and when all symptoms of increased vascular excitement have disappeared, the collapse is to be obviated by tonics and stimulants.

Purgatives are of great utility in all forms of tetanus, with the view of removing any source of irritation that may exist in the intestines. Drastic purgatives should be avoided, as instead of removing irritation they often induce it. When vascular excitement exists, this class of remedies may be used freely, so as to produce copious evacuations, and thus promote the effect of other antiphlogistic measures. For this purpose the more active purgatives, such as jalap, gamboge, scammony, &c. may be given. When the powers are depressed, croton or castor oil with turpentine or camphor, both by the mouth and by injection, is best adapted. Turpentine is especially beneficial whenever there are worms in the intestines, and as they often prove the source of irritation, without the patient being aware of the cause, an enema, consisting of an ounce of oil of turpentine with a sufficient quantity of gruel, or formed into an emulsion with yolk of egg, should be one of the first remedies employed. The constipation is occasionally very obstinate in tetanus, and purgatives have been given in very large doses, before any evacuation could be procured. Dr. Briggs has recorded an extraordinary case of this kind (*Edin. Med. and Surg. Journ.*, vol. v. p. 141.), in which, in forty-eight hours, the patient took 210 grains of scammony, 89 grains of gamboge, an ounce and four scruples of jalap, two pounds and a half of infusion of senna, and eight grains of calomel, with decided benefit. If the sphincter be spasmodically closed, so as to prevent the free passage of the fæces, an injection of the infusion of tobacco will for a time diminish the contraction, and tend also to relieve the excited state of the nervous system. When constipation is great, the tobacco enema may be tried, as the purgatives given may possibly produce the desired effect during the temporary relaxation induced by the action of the tobacco. At all times purgatives should be among the first remedies exhibited, as very little impression can be made upon the disease, until the bowels are freely opened. The action of other remedies is also favoured by a free state of the alimentary canal, which should be maintained during the whole progress of the disease. It sometimes happens that it is difficult to give medicines by the mouth, from the powerful closure of the jaws. In general, however, one or two drops of croton oil mixed with a little butter can be inserted between the teeth, but if this cannot be effected, we must have recourse to clysters.

Sedatives have been extensively employed in this disease with a view of lessening the irritation and pain that exists.

Opium has been given in enormous doses, without producing its accustomed effects on the system. Mr. Abernethy found 30 drachms of undissolved opium in the stomach of an individual who died of tetanus; 20 grains of this substance has been given every three hours for several days. According to Bégin, M. Blaise administered in ten days, 4 pounds, 7 oz., and 6 drachms of laudanum, and 6 oz., 4 drachms, and 45 grains of solid opium. Numerous other cases have been recorded where inordinate doses of this drug have been administered. Yet, although our experience of this medicine has been greater than that of any other, it has been so indiscriminately employed, both alone and in combination with other measures, that great uncertainty prevails regarding its value. On the whole it seems to have been more beneficial in idiopathic than in symptomatic tetanus. Its use has been advocated by Larrey, and opposed

by Fournier Pescay, Rush, and Macgregor. Extensive experience, moreover, has shown that it is a remedy in no way to be depended on, while we are unacquainted with any particular indications that should render its use more applicable in one case than in another. There does not appear to be any necessity for administering the extravagantly large doses so often recommended, and when employed, one or two grains should be given every hour, and this quantity doubled in six hours, if no good effect be produced. In the form of laudanum the minute division favours its operation; from one to two drachms may be given every hour, this quantity being also doubled in six hours if necessary. It may also be given in the form of enema, in half an ounce to two ounces of the tincture, or from 10 to 30 grains of solid opium. The preparations of morphia have not yet been extensively tried in this disease, though there is every probability that they will prove of as much service as opium, if not greater. M. Lambert has used it successfully in two cases by the endermic method, and M. Carioli has cured a case of traumatic tetanus in this way: the intense sedative action produced by tobacco has led to its administration in tetanus, and its effect seems to be more powerful and decided than that of opium in lessening nervous irritation, diminishing the force of the pulse, producing nausea, perspiration, and sometimes sleep. Dr. O'Beirne administered it in the form of enema, consisting of a scruple of the leaves infused in eight ounces of water, with the effect of at once producing relaxation of the muscles. On discontinuing the remedy, the spasms returned, but on resuming its use, amelioration again took place. From this time the enema was repeated two or three times a day, sometimes oftener, and continued for eighteen days. The patient completely recovered (*Dub. Hosp. Rep.*, vol. iii.). Dr. Anderson, in addition to a decoction of the fresh leaves used as an enema, employed it in the form of bath. Of five cases treated in this way, four recovered (*Med. Chir. Trans. of Edin.*, vols. i. and ii.). Several other cases have been recorded in which its beneficial effects have been well-marked in tetanus, and so far as our present experience of it has extended, it appears to be the most efficient remedy of this class. The best form of administration is that of enema, of the strength used by Dr. O'Beirne, which should be repeated sufficiently often to keep the system under its influence. Care must be taken not to increase the dose too suddenly as such prostration may be occasioned as to prove fatal. At all times a most distressing feeling of sinking and depression is induced. It should be remembered also, that some individuals are more susceptible than others to its effects, and that sailors and persons addicted to its use require a larger dose.

Antimony from its well-known depressing effect has been employed in cases where vascular excitement is well-marked. Its tendency to occasion vomiting is a powerful objection to its use, an effect which often aggravates the disease, and increases the severity of the spasms. Mr. Liston speaks of a case in which it was successful (*Lancet*, 1834-5), and another is recorded by Mr. Woodward (*Dub. Journ.*, 1835).

Hydrocyanic acid has been recommended by Mr. Ward of Gloucester (*Obs. on Tetanus*, 1835), who gave a drop and a half of it every half hour to a girl labouring under the disease, who ultimately recovered. We have very little experience of this remedy, and its sedative action is by no means so certain or manageable as that of opium or tobacco. Digitalis, stramonium, belladonna, hyosciamus, and conium, have been tried, and found comparatively inert.

The effects of the cold affusion are very similar to those of tobacco, namely, great prostration and temporary relaxation of the muscles. It has been strongly recommended by Drs. Wright, Currie, and Rush, who thought it a tonic remedy, and several cases have been recorded in which it has been the apparent means of recovery. Three in particular related by Dr. Doue, (*Nouv. Bibl. Méd.*, March, 1818) show its beneficial action when energetically employed. In other instances, however, it has failed, and in a few has occasioned sudden death. Dr. Elliotson gives an instance, and Mr. Morgan relates another, in which the patient, on being plunged into the cold

bath, died immediately. The most powerful effect is produced by pouring several buckets of cold water from a considerable height over the individual, in a continued stream. Syncope is often produced by these means, so that stimulants should be at hand, and the patient, after being wiped dry, placed in warm blankets. As he recovers, the stimulants should be discontinued, and if the spasms return, the cold affusion repeated. A less powerful effect is produced by plunging the patient into the cold bath, or dashing cold water on the body. In the present state of our knowledge cold appears, when properly applied, to be one of the most active and useful agents we possess. It has been most beneficial in the idiopathic forms of the disease.

Tonics and stimulants have been recommended by Drs. Wright, Currie, Rush, Bright, and others; and whenever there are signs of debility, either at the commencement or in the course of the disease, they are directly indicated. Rush gave wine and bark liberally with occasional success. In a remarkable case given by Dr. Currie (*Med. Rep.*, vol. i. p. 148.) the patient took 140 bottles of Madeira wine in less than a month, taking generally every twenty-four hours four or five bottles with two gallons of strong broth, some ale and brandy, and two drachms and a half of laudanum. Laudanum and ether embrocations with the tepid bath were also used. The recovery was slow. Spirits, wine, and ale, may be given in large quantities without producing their accustomed effects, although Dr. Cross is reported, when other medicines had failed, to have kept the patient for ten days in a state of intoxication with spirits, and, singular to relate, with the result of a perfect recovery. (*Good's Study of Med.*, vol. iii. p. 268.)

Fournier Pescay recommends musk, which he has used with success in doses of 10 or 12 grains every hour. Mr. S. Cooper however states, that 120 grains were given to a young girl in the space of twelve hours without producing any benefit. (*Surg. Dict.*, art. TETANUS.) Fournier Pescay gives some cases which were cured by M. François with ammonia. Carbonate of iron has been employed by Dr. Elliotson from an analogy he considers to exist between this disease and hysteria and chorea. (*Med. Chir. Trans.*, vol. xv. p. 161.) Recovery took place in two cases out of three. Dr. Dehayne of Wolverhampton gave a pound daily, and the patient got well. A larger dose than two drachms appears unnecessary, and in acute cases the remedy is inadmissible on account of the time necessary for its effects to be manifested. Quinine has also been given extensively in conjunction with stimulants and tonics. Dr. Bright has published a case that terminated successfully, in which in the course of twenty days the patient took two ounces of the sulphate of quinine, and drank daily from fourteen to twenty ounces of wine, besides taking brandy and ammonia. (*Guy's Hospital Reports*, vol. i. p. 111.) In this as well as in the generality of cases where a tonic and stimulating line of treatment has been pursued, opium was also given, so that it is impossible to know whether the recovery is attributable to any one particular remedy, or to the combined treatment. Preparations of zinc and iron and other tonics have been recommended.

Sudorifics are indicated in chronic cases when the disease arises from any sudden check to the perspiration. The vapour bath has been recommended by Dr. Marsh (*Dub. Hosp. Rep.*, vol. iv. p. 567.) who has given two cases which recovered apparently by its use. We have seen a case successfully treated in this way by M. Sanson at La Pitié, and other instances are recorded. (*Journ. Heb. de Méd.*, 1828.) Its trial has not been very extensive; for as it is necessary to keep the patient in the bath a long time, its use seems inadmissible in acute cases. The warm bath may be useful in chronic cases, as it relieves the rigidity and uneasiness which is sometimes present. In acute tetanus it is of little service, and instances are recorded where it produced sudden death. It is highly spoken of by Bajon, Chalmers, and Boyer. Fournier Pescay and Stutz used medicated baths containing the deutoxide of potassium and lime, combined with the internal administration of opium. Dr. Latham recommended Dover's powder, which in some cases has also been

beneficial. A diaphoretic treatment, with small doses of opium gradually increased, and alkaline baths, has proved successful in the hands of M. Fritz of Prague.

Among the other remedies which have been employed, mercury has been extensively given, although on what principle it is difficult to explain; for although it tends to lessen inflammation, and sometimes acts as a stimulant, we possess better and more powerful remedies for these purposes. Whenever success has attended the use of this mineral, it has been combined with opium or some other remedy, so that it is impossible to speak decidedly as to its effects. Mr. Curling has seen two cases where the ptyalism it occasioned, produced great suffering, and in which the patients were compelled to keep their lips constantly open with their fingers, in order to prevent the suffocating paroxysms consequent upon attempting to swallow the saliva. Camphor, from its combined narcotic and stimulant properties, may be given in some cases with benefit, particularly in the form of enema. Combined with opium it is much praised by Larrey. Colchicum has been given with partial success by Drs. Smith and Dufresnoy, combined with opium. Injection into the veins of a watery solution of opium and stramonium has been employed by MM. Percy and Laurent. Dazille recommends ether. Counter-irritants applied to the spine are beneficial in chronic cases. M. Cruveilhier apparently cured a patient in whom the hiccup and spasms were very distressing, by constant pressure on the abdomen. (*Rév. Méd.*, Avril, 1824.) Other remedies have been recommended and occasionally tried, such as phosphorus, electricity, strychnine, acupuncture, &c. but we have no proof of their efficacy.

In all cases of tetanus the diet should be light, consisting of soups, gruel, &c. It should be antiphlogistic when there are symptoms of excitement, and nourishing when the vital powers are depressed. It is not always easy to give the patient sufficient nourishment, as sometimes the teeth are so firmly closed, that no substance whatever can be introduced: in other instances all attempts to swallow bring on the most violent spasms. In the former case, liquid food may be introduced into the stomach through a tube passed into the stomach by the nostrils, and in the latter the spasmodic action should be overcome by tobacco injections, and advantage taken of the period of prostration to give food. Articles of nourishment may also be thrown into the intestines by the syringe.

HYDROPHOBIA.

Definition of the disease.—*Premonitory symptoms.*—*Symptoms of the attack.*—*Various modifications observed in the symptoms in the human subject.*—*Symptoms of rabies in the dog.*—*Predisposing causes.*—*Exciting causes.*—*Nature.*—*Anatomical characters.*—*Diagnosis.*—*Prognosis.*—*Prophylactic or preventive treatment.*—*Curative treatment.*

THE disease termed hydrophobia (from ὕδωρ, water, and φόβος, fear) is characterised by spasms of the muscles of the pharynx and chest; difficulty of drinking, and dread of fluids; great restlessness, and mental inquietude.

From the circumstance that water is not the only substance which causes dread, it has been denominated *hygrophobia*, with a view of indicating the inability to swallow any kind of liquid; *phobodipsia*, to express the presence of thirst, with the dread of liquids; *aërophobia*, or dread of air; *pantaphobia*, dread of all things. As these various terms allude to a symptom which is only occasionally present, they are in no respect preferable to that of hydro-

phobia. Some modern authors have called it *rabies*, *rabies canina*, or *rage*; but these denominations imply delirium, or a furious state of mind, which is rarely observed, and the word *canina* is evidently useless, as the malady is occasioned not only by the bites of dogs, but of cats, wolves, and other animals. The disease is called *lyssa* in the nosology of Dr. Good, from *λύσσα*, a word used by the Greeks to express madness in dogs; but rabies in these animals differs from hydrophobia in the human subject. The French have endeavoured to establish two diseases, according as the symptoms are produced by the bite of a rabid animal, or by other causes. The former they call *la rage*, and the latter *hydrophobie*. But the symptoms and treatment in both are identical, and, as far as our present knowledge extends, their nature is the same. We do not therefore consider that any of the terms which have been proposed are at all preferable to that of hydrophobia, although undoubtedly it is not free from objection; but there is scarcely a disorder which does not undergo modifications in different individuals; and, as Dr. Bardsley has stated, "few rational physicians expect to find the history of a disease condensed into a sort of essence in its name." As moreover, notwithstanding the various alterations which have been proposed, the term hydrophobia has been generally employed for a series of ages, and is still almost universally adopted, we shall retain it to express the group of symptoms above detailed, from whatever cause they proceed, as well as when the disease undoubtedly arises from the bite of a rabid animal.

Symptoms. Some authors have divided the disease into periods or stages, denoted by the appearance of certain symptoms. As such divisions, however, are purely arbitrary, and lead to no practical utility, we shall describe, 1. The premonitory symptoms; and, 2. Those which constitute the attack.

1. When the disease, as is generally the case, arises from the bite of a rabid animal, the most marked premonitory symptom is pain in or round the bitten part, which often resembles that caused by rheumatism, and sometimes attended with itching. The nature of the pain is liable to variations, being more or less acute; sometimes there is a feeling of torpor, stiffness, tingling, heat or coldness, which does not amount to actual suffering. The pain extends gradually along the course of the nerves, and if the hand be the part bitten, shoots to the forearm, arm, or shoulder, and sometimes to the muscles of the neck; or, if the injury be in the leg, to the thigh, hip, or loins. In some cases the pain does not arise in the wound, but in a part near the trunk, as the shoulder or hip; the cicatrix swells, inflames, becomes red or livid, and occasionally, after it has cicatrised, opens, discharging an ichorous matter. Sometimes the pain shoots from the wound to the region of the heart, and now and then darting pains are felt in various parts of the body. Callisen (*Syst. Chir. Hodiern.*, vol. i. p. 595.), Marcet, and Babington, have observed that these pains follow the course of the nerves, and never irritate or produce inflammation in the absorbent glands or vessels. The local symptoms detailed are often accompanied by desire of solitude, unwillingness to answer questions, dull despair, and other signs of mental depression; but more generally the intellectual faculties are not at all altered; not unfrequently, indeed, the imagination is more fertile, the memory stronger, the patient's conversation animated, both the mental and bodily powers displaying unusual activity. In some cases, on the other hand, there is intolerance of light, with dilatation of the pupil, contracted eyebrows, and tumid face; or wandering pains in the neck, trunk, or limbs; pain, or a sense of heaviness in the head; restlessness, drowsiness, and disturbed sleep; occasionally sighing, momentary flushes and rigors, slight febrile symptoms, loathing of food, loss of appetite, nausea, vomiting, constipation, pains in the abdomen, &c.

These premonitory symptoms are not peculiar to hydrophobia; but when one or more occur after an individual has been bitten by a dog, there is just cause for alarm. The symptoms do not follow any order which can indicate

an approaching attack of hydrophobia; pain in the wounded part being felt by one patient, melancholy by another, or intolerance of light by a third; on the other hand, every one of these have been absent in certain cases.

The duration of the premonitory symptoms is, in general, from four to six days; cases however have occurred, in which they existed two or three days only.

2. *Symptoms of the disease.* Hydrophobia may be considered established when there is a peculiar constriction about the throat, which, at the commencement, is usually slight. It frequently resembles a feeling of stiffness, gradually extending towards the root of the tongue and thyroid cartilage, and is often accompanied with pain. The patient experiences difficulty of swallowing, especially fluids; and all endeavours to accomplish this are apparently prevented by sobbing, or deep catching sighs. At the same time the liquid contained in any vessel held in the hand, is generally either spilt on the ground or violently jerked to a distance. These symptoms are usually of short duration, but often leave in the mind of the patient a continual dread of water or other fluids, so that even the idea of drinking induces their return. Deglutition gradually becomes more and more difficult, until at length, any attempt to swallow, particularly liquids, produces violent spasm of the muscles of the pharynx and larynx, and occasionally of those of the face, the patient being, at the same time, thrown into a state of the greatest agitation and alarm. The horror of fluids is often such that any circumstance which can lead to the idea of drinking, as the splashing or running of water, the sight of jugs or glasses, the rattling of earthenware, the noise of a pump, or even the mention of any kind of beverage, is often sufficient to occasion a recurrence of the spasms. As the disease advances, the irritability becomes greater, the spasms are more frequent and prolonged, and though generally confined to a limited number of muscles, occasionally the whole muscular system is affected, and such is the morbid sensibility, that the spasms may be excited by various trifling causes, as a current of air, opening a door or window, a strong light, looking at a polished surface, &c.

In the interval of the paroxysms, there is an unusual degree of debility. As the spasms increase in frequency, the respiration becomes more uneasy, and often interrupted by occasional deep inspirations or sighs; some individuals scream loudly from slight causes. To these succeed flatulent eructations, often vomiting, urgent thirst, sense of obstruction in the throat, increased secretion of saliva, intense headach, and acute pain, either in the epigastrium or throughout the whole course of the spine, particularly in the cervical portion. The state of the patient is now very distressing; the countenance expresses the utmost anxiety and alarm; the eyebrows are contracted; the eyes staring and glassy, giving a peculiar wild expression; there is intolerance of light, and of sounds; the speech is abrupt and rapid; the angles of the mouth are drawn slightly upwards, giving the countenance an expression somewhat approaching the risus sardonicus; the face is sometimes pale, often flushed or covered with large irregular ruddy spots; the saliva is secreted abundantly, and ejected repeatedly and with considerable force; the heat of the skin is in general natural, but occasionally increased; the pulse is quick, and of variable strength; and the respiration, although in some cases not much affected, is usually hurried and laborious. In the midst of so much suffering, the intelligence remains perfect, and the patient retains his consciousness. These aggravated symptoms may be established a few hours after the commencement of the disease, but in general are not fully developed before the second day. The disorder now progresses rapidly; the patient experiences a burning heat and dryness in the throat; and the attempts to relieve this by drinks produce severe convulsions of the whole body, in which the patient appears on the point of suffocation. The spasms appear to come on spontaneously, or to be produced by the most trivial causes, as touching the surface, or the hairs of the head; the saliva becomes thick, viscid, and adhesive; it accumulates

about the glottis, increasing the irritation in the throat; and, in the efforts the patient makes to remove it, rapid reiterated noises are produced, which have been supposed by the vulgar to resemble the bark of a dog. The voice is hoarse; the feeling of thirst and sometimes of hunger, the pain in the stomach and tension of the præcordia, become more urgent, and the eructations more frequent; vomiting of a yellow, greenish, glairy, or grumous fluid succeeds, the abdomen being, at the same time, distended, or sometimes retracted and drawn towards the spine. As the fatal issue approaches, there is general and incessant tremor; the convulsions are increased in frequency and violence; the sense of suffocation is more urgent; and from the difficulty of expelling the saliva, it collects in the mouth, and flows over the lips; the pulse becomes small, irregular, feeble, and rapid; the patient evinces great terror, or lapses into a state of wild delirium; hiccough and rapid breathing succeed, followed by gradual exhaustion; and at length the patient dies in an intense paroxysm. Sometimes a temporary calm takes place before death, which, however, is only the precursor to a fatal return of the spasms; occasionally, the unfortunate sufferer expires in perfect tranquillity.

The duration of the hydrophobic symptoms is in general from two to three days; but cases are recorded in which they have been prolonged to eight or nine days. The disease has also been known to be fatal in thirty-six hours.

Such is the general progress of this dreadful disease; but almost every one of the above symptoms occasionally undergo modifications. The dread of water and liquids has always been considered the most remarkable symptom of the disorder, and apparently arises from a conviction the patient entertains, that every attempt to swallow will produce the greatest suffering. Though there is difficulty in swallowing any thing, it has been observed that the deglutition of solids does not occasion such distress as that of liquids,—a circumstance which has been attributed to the greater surface of the pharynx, with which the latter, in the act of deglutition, are brought into contact. Some individuals have resolutely determined to swallow water, and have only been prevented by the violent pharyngeal spasms which the contact of the liquid occasioned; others, who have retained an insuperable aversion to water, have been able to drink easily red wine, or broth. M. Cayol attended a young girl labouring under this disease, who had no great dread of liquids, though she disliked them, and was not absolutely unable to swallow them, notwithstanding there was great difficulty in the effort. Dr. Bright and others have recorded cases in which there was no abhorrence of fluids, but only a disinclination to swallow, or to allow any thing to approach the mouth. In the course of the disease, this symptom undergoes remissions, not unfrequently before death. Occasionally, also, there is complete intermission, during which the patient drinks with tolerable comfort.

The mental faculties are generally observed to be altered, but in what the alteration consists it is often difficult to determine. The consciousness and reasoning powers usually remain perfect in the midst of the most dreadful sufferings; but there is evidently mental excitement, manifested by increased loquacity, and circumstantial explanations, unusual and uncalled for on the part of the individual. There is often great tendency to take alarm from trivial causes, to form suspicions without adequate motives, and an extraordinary susceptibility to circumstances associated with the idea of drinking. These symptoms are liable to various alterations in different individuals; in some cases they have been altogether absent, the mind having been little disturbed from the commencement to the termination of the disease. Furious delirium is rarely present, and then only during violent paroxysms or towards the close of the disease. But there is often, even soon after the commencement of the symptoms, muttering, unconnected talking, and hallucinations of mind, although, when spoken to, the patient gives rational answers. The mental faculties also evidently exercise considerable influence over the other symptoms, which have

been observed to be more or less distressing and urgent, according to the weakness or strength of the patient's intellect.

The sensibility, both general and special, may be greatly increased. There is always great pain in the throat, sometimes in the thyroid gland, and occasionally in the neck and spinal column. This increases as the spasms become more violent; and when the symptoms are intense, there is usually excruciating pain in the chest and epigastrium. Though in most instances patients betray great dread of being touched, and regard with aversion the approach of individuals, particularly strangers, the sense to touch remains unaltered: sometimes a sense of tickling is produced by contact. In other instances the sense of touch is very acute, and great uneasiness is often occasioned by the contact of the lightest body, or by currents of cold or heated air. In a case described by Magendie, touching the hair induced a recurrence of the spasms; and in another by Dr. Powell, the same effect was produced by a fly settling on the face. It has been noticed that the sensibility to light is also morbidly increased; hence daylight, burning objects, brilliant colours, and polished surfaces, often produce great distress and a return of the paroxysms. The hearing is also very acute, and noises that cannot be distinguished by others, are occasionally complained of. A patient treated by Magendie heard distinctly, during the paroxysms, though born deaf and dumb. Disagreeable odours also are sometimes perceived, which are inappreciable to others. It almost always happens however, that, towards the end of the disease, the different senses become more or less obtuse, and even entirely lost.

The muscular system is variously affected. The disease essentially consists in a spasm of the pharyngeal or laryngeal muscles, of greater or less intensity, occasioning the difficulty of deglutition, particularly of liquids, which forms the prominent symptom of the disorder. Occasionally the spasms appear to commence by rigidity and stiffness at the root of the tongue. Inspection of the throat in some cases detects turgescence and other signs of inflammation about the fauces, but in others nothing morbid can be seen. In the intervals there is not unfrequently unnatural activity, and occasionally a desire to perform certain motions, as leaping upwards, running backwards, climbing, &c. Towards the termination of the disease, the hands and legs are thrown about convulsively, and sometimes the spasms resemble those of tetanus, the trunk being drawn backwards. In a case given by Dr. J. Johnson, the sphincter ani was so firmly constricted by spasm, that powerful efforts to pass a clyster-pipe failed. In some cases the spasms are accompanied by priapism, contraction of the cremasters, and involuntary seminal emissions; in others, towards the termination, paraplegia, hemiplegia, or general paralysis, supervene. The pulse is generally accelerated, but of variable strength. At a late period it becomes quick (sometimes 150 in the minute), weak, wiry, and irregular. The respiration is differently affected in various stages of the disease. At the commencement the breathing is convulsive, or the patient sighs deeply; or there are sobs, occasioned by efforts to swallow, or by terror. As the paroxysms become more intense, the respiration is difficult and laborious, so that suffocation is often threatened. During the remissions the breathing becomes more easy, but sometimes interrupted by frequent sighs and sobs every fourth or fifth inspiration. The skin is not unfrequently covered with a profuse perspiration, but sometimes it is hot and dry, occasionally harsh, while the heat is not increased; in one or two cases it has been observed livid. The excretions are not particularly affected; occasionally there is great constipation. In general there is no alteration in the urine; in some few cases it has been observed to be scanty, and of a pale greenish or lemon colour; in others high-coloured. Towards the termination of the disorder both fæces and urine are often passed involuntarily.

The mouth is usually filled with saliva, which at first frothy, becomes gradually so thick and tenacious as to adhere to the lips. The tongue is sometimes moist, and more or less furred. Nausea is a frequent symptom, and in

the fatal forms of the disease there is not unfrequently vomiting of a yellow, greenish, glairy or grumous fluid, resembling coffee-grounds.

Symptoms of rabies in the dog. As every practitioner, particularly in the country, is liable occasionally to be called on to determine whether a dog is rabid, we shall give the principal symptoms of rabies in this animal, referring to works on veterinary medicine for more ample details, and especially to the treatise of Mr. Youatt on this subject. It is necessary at the commencement to remove from the mind an idea which is very general, viz. that the disease in quadrupeds is similar to hydrophobia in man. Many persons suppose, that as the animal does not evince any dread of water, or appear wild and furious, it is not in a rabid state, and have consequently been lulled into dangerous security. The first symptom observed in the dog is a change in his usual habits; in some there is a disposition to pick up straws, rags, bits of paper, or any small objects; in others, licking cold surfaces, as iron, stones, &c. or different parts of other dogs that may be domesticated with him. Sometimes the dog becomes attached to animals formerly regarded with indifference, but more generally an antipathy to strange dogs and cats is early observed, particularly to cats. It becomes lonely and irritable; is less eager for food, or neglects it, but is evidently thirsty: there is sometimes redness and watering of the eyes; the ears and tail droop, and his look is suspicious and haggard. In a short time the respiration becomes difficult; sometimes there is vomiting, and saliva flows from the mouth, which soon assumes the form of viscid foam. The rabid dog now shows great irritability, with disposition to bite other animals, but is still obedient to the voice of its master; and though seldom, unless enraged, attacking the human subject, occasionally flies at every creature it meets. Holding up a stick or whip invariably excites great fury, and never intimidates. In the advanced stage of the malady, the breathing becomes more laborious, and death takes place during strong convulsions.

In the lower animals there is no dread of water; the dog, although unable to swallow, flies to it with eagerness; and all other quadrupeds in the rabid state, with perhaps an occasional exception in the horse, drink with ease and with increased avidity. (*Youatt.*) In most instances, also, there is not the savage fury which persons in general expect to find, but rather a snappish irritability. In many instances, however, the most furiously rabid animals are obedient to the master's control.

Causes. Whether there be any particular *predisposing* causes of hydrophobia is at present a matter of great doubt, inasmuch as it has attacked individuals of both sexes, at all ages, and in all seasons and climates. Neither has any particular constitution, habit of body, diet, or other circumstances, been found incompatible with the manifestation of the disease. It has, undoubtedly, been more common in some countries than in others, and in these countries more frequent at particular periods. The lower classes also have been more frequently affected. These circumstances, however, do not appear to be connected with any inherent predisposition in the human frame, but are owing to accidental occurrences, such as the greater prevalence of rabies among dogs, or other animals, in particular countries, and at different seasons, while the labouring classes are necessarily more exposed. In the absence of positive knowledge on this subject, therefore, we do not consider ourselves warranted in entering into a consideration of what some have considered predisposing causes of hydrophobia.

Of the *exciting* causes the introduction into the system of the saliva of rabid animals is by far the most frequent. Though it has been generally thought that the hydrophobic poison can be introduced only by the medium of a wound inflicted by the bite of a rabid animal, yet, according to Portal, Matthieu, Gillman, and others, the disease may be developed when the mucous membrane has been exposed to the action of the virus. That inoculation is necessary to the production of hydrophobia, is established by the following facts:—1. The same phenomena having been known to follow the bite of

dogs from the earliest ages. 2. The similarity of the symptoms in different persons who have been bitten by the same rabid animal. 3. The more frequent occurrence of the disease in those who have received the bite on uncovered parts, as the hands and face; and, 4. By experimental proofs that the introduction of the saliva of a rabid animal into the system of a healthy quadruped will produce the same disease. Magendie and Breschet induced rabies in the dog by inoculating the animal with the saliva of a hydrophobic man. We consider it unnecessary to allude to particular examples, with a view of proving the above statements. That the bite of a mad dog will occasion hydrophobia has been universally believed for a series of ages,—a belief that the careful observations and scientific researches of modern times have tended to confirm.

We consider it, however, incontestibly proved, that other causes are capable of producing hydrophobia, attended with symptoms exactly resembling those occasioned by the bite of a rabid animal. Pinel relates the case of a young soldier who, disliking the military profession, secluded himself. His comrades attributing this to cowardice, entered at midnight into his chamber, beating the charge on the drum, and crying that the Austrians had passed the Rhine. He was immediately seized with convulsions, accompanied with a sensation of burning and constriction in the throat, dread of liquids, and expectoration of a copious frothy saliva. In the morning, the horror of fluids and burning pain in the throat were more intense, accompanied with a sense of weight in the head, hurried and irregular respiration, intermittent feeble pulse, and intolerance of light, but without alteration of the intellectual functions. He was certain that he had never been bitten by any animal. The symptoms increased, and he died. The examination presented nothing extraordinary. A quantity of mucus only was found in the throat. (Pinel, *Nosog. Phil.*, tom. iii. p. 145. 4th edit.) The minute details of this case, corresponding with the principal symptoms described as constituting hydrophobia, were identical with those of hydrophobia arising from inoculation. In Hufeland's *Journal* (December, 1833) there is a similar case, from the bite of a dog received five weeks before the symptoms appeared. The dog was perfectly healthy, and remained so after the individual bitten had died labouring under the most dreadful form of hydrophobia. A well reported case, occasioned by great fatigue during a hot day, is also recorded, in which all the symptoms of hydrophobia were well-marked: it terminated fatally. (*Journ. des Savans*, Août, 1757, p. 81.) In others, horror of water, and symptoms resembling hydrophobia, have followed rheumatic and inflammatory affections, exanthematous fevers, cerebral lesions, suppression of habitual discharges, some kinds of poisons, &c. (*Dict. des Sciences Méd.*, art. HYDROPHOBIE.) Many of these cases no doubt are not sufficiently well detailed to demonstrate satisfactorily that the disease was in every respect identical with hydrophobia; but a sufficient number exist to prove, that it has not unfrequently occurred independently of hysteric, epileptic, or tetanic complication. It may then be considered perfectly established, that hydrophobia is the result of a peculiar poison with which the system may be inoculated, but that it may also be occasioned by other causes, especially powerful mental impressions.

These facts have led to much dispute; some thinking that the state of the mind induces the disease, because the symptoms come on some time after the local injury, and are preceded by evident signs of mental disturbance. Others affirm that it can only be produced by the hydrophobic virus, and that the supposed terror may have originated in some bite which had been forgotten. A third class adopt neither of these views, but consider one cause or the other as producing distinct diseases; the one they denominate hydrophobia, and the other, "La rage." That inoculation is alone sufficient to produce the disorder, is proved by its having been thus occasioned in infants, horses, asses, &c. in whom the force of imagination cannot be supposed to operate. Five cases also are reported by Mr. Hewitt to have occurred in natives of the East

Indies who were bitten by a jackal, and who had never heard of the disease, or had even a suspicion of its nature. (*Med. Chir. Trans.*, vol. xiii.) On the other hand there is every reason to suppose, that the disease may occur solely from mental disturbance, or the other causes to which we have alluded. We see no reason, therefore, for adopting any exclusive view of the origin of hydrophobia, or for considering diseases distinct because their exciting causes are different. Many fevers and eruptive disorders may arise spontaneously, or be the result of contagion. Tetanus, it is known, may be produced by exposure to cold, or it may succeed to wounds, or the introduction of poisons, such as strychnine for example. In like manner paralysis may be occasioned by a poison (lead), as well as by mental emotions or other causes. Epilepsy, and numerous other diseases, may arise from causes widely different, and yet, as far as our means of observation extend, the disease occasioned is identically the same. Such we consider to be the case with hydrophobia. It has been remarked with regard to tetanus and other affections, that the influence of a wound, combined with that of exposure to cold and bad weather, or terror, has a greater effect in the production of the disorder than when one of these causes acts alone. The same is the case with hydrophobia; the bite of a rabid animal is more liable to produce the malady in individuals who are impressed with a horror and dread of its effects, than in those who do not experience any imaginary fears. We have observed that in some years, when the public prints industriously circulate an account of the dreadful symptoms of hydrophobia, and the means necessary to guard against their appearance, cases soon become very frequent; and although this may undoubtedly be attributed to other causes, it is not improbable that the moral effects thus produced may favour the production of the disease.

The accession of the symptoms may take place at different periods after the reception of the bite. Mr. S. Cooper states, that of 131 cases none of the patients became ill before the eleventh day after the bite, and only 3 before the eighteenth. Of 15 cases mentioned by Troiliet, 7 were attacked between the fourteenth and thirtieth days; 5 between the thirtieth and fortieth days; 2 a little after that period; and 1 after fourteen weeks. (*Obs. Chir. sur la Rage*.) The most general period is between the twentieth and fortieth days, but cases are mentioned by Marestan, Astruc, Willoughby, and others, in which it occurred two, three, and six days after the bite. On the other hand, numerous instances are recorded in which several months have elapsed. Dr. J. Vaughan mentions an interval of nine months; Mead of eleven months; and Bauheir and Boissière of a year; Brown and Adams fifteen months (*Trans. Med. and Phys. Soc. of Calcutta*); Nourse of nineteen months; R. Lentilius of three years (*Cooper's Dict.*, art. HYDROPHOBIA); and Lusitanus, four years. (*De Prax. Admir.*, lib. iii. obs. 87.) Dr. S. Bardsley gives a case that occurred twelve years after a bite had been received (*Manchester Memoirs*, vol. iv.); and others are recorded where it is said to have appeared after an interval of eighteen, twenty, and even thirty years. (*Dict. des Sciences Méd.*, art. RAGE.) We cannot however suppose, that in any of these latter cases the bite was the exciting cause of the disease, though it is difficult to determine what is the latest period at which the virus may be supposed capable of producing the disorder. Dr. J. Hunter considered seventeen months, and Dr. Hamilton nineteen months, as the longest possible interval. (*On Hydrop.*, vol. i. p. 115.) Dr. J. L. Bardsley thinks two years constitute the limit. (*Cyc. of Pract. Med.*, art. HYDROPHOBIA.) We may observe, however, that even these periods appear to be very long for a poison to lurk in the system without producing any effect; and knowing that mental disturbance is capable of producing the disease, there must always be great doubts whether or not such cases were produced by the former or the latter cause. When hydrophobia is occasioned by mental impressions, the interval is not so long. The premonitory symptoms commence at once, and last from one to five days, and occasionally the disease is declared immediately. This is the only important

distinction between spontaneous hydrophobia and that occurring from inoculation; but no nosologist would be warranted in founding a distinction on a circumstance, which in all diseases, and in this more especially, is so uncertain.

Anatomical characters. In this, as in other diseases of the nervous system, no uniform appearances have been presented after death.

The brain has, in several instances, presented signs of congestion. The sinuses and vessels of the membranes have been observed considerably injected, and more or less effusion of serum found in the ventricles, and in the arachnoid and subarachnoid cavities. These appearances were found in six cases dissected by Troiliet (*Sur la Rage*), who also observed the surface of the cerebrum studded with scarlet points, and the plexus choroides of a brown colour, and gorged with blood. In two cases, blood was extravasated towards the base of the brain in large quantity; and in others there existed a plexus of vessels somewhat injected, surrounding the origin of the optic and pneumogastric nerves. In five cases inspected by Dr. J. L. Bardsley (*Cyc. of Pract. Med.*), three presented traces of considerable cerebral vascularity; in the fourth there was only slight turgescence of the vessels of the pia mater, and rather more distension than usual of the choroid plexus; in the fifth the brain was natural. Dr. Marshall and other writers have also shown the frequent existence of congestion within the cranium. In some cases the substance of the organ has been found somewhat softened, and in one or two instances rather indurated. Bony depositions have been occasionally met with in different parts of the dura mater and arachnoid. On the other hand, Van Swieten, Bonetus, Lieutaud, and others, have seen cases where, after death, no alteration whatever could be detected in the brain.

The spinal cord has often been found to exhibit signs of congestion. Instances of this kind have been reported by Salin, Brera, Saunders, Reid, Troiliet, Ribes, Ollivier, Goodrich, and others. Dr. A. T. Thomson has recorded a case in which the spinal cord was covered with blood, and its vessels turgid. (*Med. Chir. Trans.*, vol. xiii.) M. Mathey found a quantity of serum within the spinal canal. (*Journ. Gén. de Méd.*, tom. liv. p. 279.) In a case by M. Clot, cited by Ollivier, the cellular tissue which surrounded the cervical portion of the cord was very red, and infiltrated with a large quantity of blood. Its substance also, at this part, was intensely inflamed, contrasting strongly with the whiteness of the dorsal and lumbar portions. Ollivier has found softening in the inferior portion of the dorsal region in an individual who died of the disease. In a case by Dr. Bright also (*Hosp. Rep.*, case 285.), the whole substance of the cord was found softened for a quarter of an inch in the same situation. A case is given in Johnson's *Med. Chir. Rev.*, 1817, in which the principal marks of disease were in the coverings of the pons Varolii, medulla oblongata, and upper part of the spinal cord. These parts formed one crust of inflammation, most intense on the spinal cord. Similar lesions have been found in the lower animals by Dupuy and Barthelemy. Dr. Bright tells us, that in one case examined at St. Thomas's Hospital, small plates of bone were found in the arachnoid of the spinal cord. In several instances, however, no morbid appearances whatever could be detected in the spinal marrow. M. Gendrin, in particular, says he has examined many cases of hydrophobia, and never could discover any disease in the spinal cord or nervous ganglia. (*Transl. of Abercrombie on the Brain*, p. 578.)

The pharynx and œsophagus, to which the most prominent symptoms of the disorder are referred, have often been found diseased. Sauvages, Rossi, Rush, Gorci, Ribes, Bardsley, and others, have found marks of inflammation in one or other of these situations, and sometimes in both. Dr. Powell found the œsophagus covered by a thin layer of coagulable lymph, an appearance also seen by Oldknow, Ballingall, and Ferrier. Dr. J. L. Bardsley in one case discovered in the œsophagus a membrane lying closely within the orifice without filling up the cavity. When inflated by the blowpipe, it assumed a

tubular appearance. He considered it a portion of the internal membrane of the œsophagus. In other cases, however, no morbid change could be discovered in these parts, or they were only covered by a frothy mucus. In the six cases dissected by Troillet the mouth and fauces were of a pale greyish colour, and no signs of inflammation existed in the pharynx.

The lungs have often been found somewhat engorged with blood, and of a deep red colour. This occurred in all the six cases examined by Troillet, as well as in those observed by Morgagni, Portal, Oldknow, Ballingall, Marshall, and numerous other writers. The larynx, trachea, and bronchiæ, have presented traces of inflammation, and been found lined with a thick, white, frothy mucus by Faure, Troillet, Rush, Ribes, Lalouette, and others. The extent and intensity of this inflammation appear from the dissections that have been made to be proportionate to the violence of the dyspnœa.

In two cases by Troillet, gelatinous clots were found in the heart and large vessels, but the greater portion of the blood was black and fluid, as in subjects who have died of asphyxia.

The mucous membrane of the stomach and small intestines have been found more or less inflamed by Morgagni, Powell, Oldknow, Ballingall, and others. Dupuytren found the former almost gangrenous. The salivary glands have occasionally been found enlarged and very vascular. Numerous alterations and displacements of the other viscera have been reported by different authors, which we have reason to believe were accidental.

It should also be understood, that some individuals have died of hydrophobia, in whom no alterations whatever, either, in the nervous, circulatory, respiratory, or digestive systems, have been found. (*Vaughan, Fabbioni, &c.*)

Nature. The essential symptoms of this disorder are sufficient to demonstrate that it is dependent on some pathological condition of the nervous system, but in what this consists we are wholly ignorant. Some have thought it must be attributed to inflammation of the pharynx or œsophagus, others to congestion or inflammation of the brain, while a third class have considered it dependent on some irritation of the spinal marrow. These views, however, have been drawn from a very limited number of observations, in which particular morbid alterations have led to the theories maintained. But the variety of appearances presented on dissection, and the occasional absence of one or the other, or all of them in particular cases, sufficiently proves that morbid anatomy is as yet unable to furnish us with a sufficiently extended series of facts from which we can deduce any positive conclusions as to the nature or seat of hydrophobia. Did we indeed infer the cause from the effects, we might with some show of reason attribute the disease to more or less pressure upon the eighth pair of nerves. A careful perusal of the experiments made upon this nerve by physiologists, and particularly by Dr. John Reid of Edinburgh (*Edin. Med. and Surg. Journ.*, No. cxxxiv.), will show that congestion of the membranes at the base of the brain, producing more or less pressure upon the origin of these nerves, is capable of explaining all the phenomena the disorder presents, viz. spasms of the pharynx, accompanied with pain extending to those of the larynx and lower part of the face, dyspnœa, secretion of frothy mucus, pain in the back of the neck, chest, or epigastrium, nausea, vomiting, &c.; while the other symptoms, such as the excited mental faculties, delirium, increased sensibility, &c. may be ascribed to the participation of the cerebrum, the fifth and other nerves, in the morbid action. Had we space to follow this theory, we could satisfactorily show that it is supported by more anatomical, physiological, and pathological facts, than any other, and fully agrees with the researches of the accurate experimenter to whom we have above alluded. If attention during post mortem examinations in cases of hydrophobia were more particularly directed towards this view of the subject, we might be able to speak with certainty regarding it. On this point, however, the present state of science has only furnished us with conjecture. The same may be said of other questions connected with the pathology of this disease,

such as the origin of the virus; the changes it undergoes after the bite, and before the commencement of the premonitory symptoms; whether it produces its effects directly or indirectly, by absorption or otherwise; whether the disease is communicable by man, when it arises from other causes besides inoculation, &c. These interesting questions have been fully discussed by various authors, without any positive results having been arrived at, a circumstance which in some degree reconciles us to the necessity imposed upon us by our limits, of not entering into their consideration.

Diagnosis. Hydrophobia, when perfectly developed, presents such peculiarities as readily distinguish it from all other disorders. The bite of a rabid animal may have healed up however, and have been forgotten long before the appearance of the premonitory symptoms, and under such circumstances these may be mistaken for melancholy and hypochondriasis. The rapid progress of hydrophobia, and the manifestation of the characteristic symptoms of the disorder, such as difficulty of deglutition, dread of water, &c. will soon clear up any doubts that may exist.

Many writers have pointed out the similarity between hydrophobia and tetanus, and undoubtedly they resemble each other in many particulars. In general, however, the spasms in the former are clonic, of short duration, and followed by distinct intervals; in the latter they are tonic, of longer or shorter duration, with remissions only. In hydrophobia the pharynx and root of the tongue are the parts first complained of, and the mouth opens and shuts readily. In tetanus there is almost always pain and stiffness in the muscles of the jaws, which gradually become fixed and closed. Thirst, vomiting, and febrile symptoms, are common in hydrophobia, rare in tetanus. In the first also the mind is unusually excited from the beginning, in the latter it is rarely altered, and then only towards the termination. A knowledge of these circumstances can rarely fail in detecting hydrophobia from tetanus, even when it arises independently of a bite. It must not be denied, however, that instances have occasionally occurred, in which the diagnosis has been very difficult. Cases are recorded arising from the bite of a rabid animal, in which, together with all the symptoms of hydrophobia, there was tetanic rigidity of the muscles with complete opisthotonos. On the other hand, traumatic tetanus may exist, with constriction of the throat, horror of liquids, increased sensibility, abundant flow of saliva, and all the symptoms of hydrophobia. Such instances, however, are very rare, and are only to be detected by taking into consideration the causes, period of accession, and progress of the symptoms.

Hydrophobia may be confounded with some rare forms of hysteria. The history of the case, presence of the globus, boborygmi, absence of increased salivary secretion, &c. will distinguish it. Hydrophobia from inoculation is known by the traces of a bite, the local symptoms connected with it, and the accession from the twentieth to the fortieth day, while in that arising from other causes there is no wound, and there are no local symptoms.

Prognosis. Hydrophobia must be considered as one of the most fatal diseases to which the human subject is liable, and by some authors has been thought invariably to terminate in death. Several cases, however, caused by inoculation, are recorded, in which all the symptoms have been present, and yet recovery has taken place. Hydrophobia induced by the bites of rabid animals is much more fatal than that arising from other causes. It has been thought by some that wild animals inflict more dangerous injuries than those which are domesticated, a circumstance which, if true, may be attributed, not to any greater intensity of the virus, but the deeper wounds such animals inflict, and the more perfect inoculation thus occasioned. Wolves also, with regard to which this remark has principally been made, usually fly at the face, while dogs bite through the clothes. Others however maintain, that small wounds are more dangerous than large, as in the former the flow of blood is not great, and does not wash away the virus which is deposited.

The proportion which the occurrence of hydrophobia bears to the number of persons bitten is unknown. Mr. J. Hunter has stated that on one occasion a dog bit twenty persons, of whom only one became affected with the disease. In 1780 at Senlis, a dog bit fifteen persons, of whom three afterwards died of hydrophobia. At Brives seventeen persons were bit by a wolf: of these ten died. Of twenty-three others bit by a she-wolf, thirteen died. (*Troilliet.*) The chances of escape ought never to be relied on, as no doubt can exist that the individual who has been bitten by a rabid animal incurs great risk, and the prognosis must always be more unfavourable when no preventive measures have been employed, than when excision or cauterisation has been had recourse to.

Treatment. A survey of the causes which occasion hydrophobia, as well as the symptoms of the disease when it is fully established, shows that the treatment should be divided into the prophylactic or preventive, and curative.

1. *Prophylactic treatment.* As we shall afterwards have occasion to observe, medicine has little control over the disease when once fully established: the prevention of the disease is consequently the principal means of escaping the extreme suffering and dreadful death which hydrophobia in general occasions. It fortunately happens that we are with tolerable certainty enabled to guard against the invasion of the disease when an individual has been bitten by a rabid animal, and we think it may be truly stated, that every person who has once witnessed the disorder would cheerfully submit to any temporary pain, to give even the chance of being relieved from its horrors. Of all methods the complete excision of the bitten parts, and the immediate application of some powerful caustic to the raw surface, is that which undoubtedly merits the greatest confidence. When this cannot be done immediately from want of instruments or necessary assistance, the wound should be perseveringly washed with tepid water. Dr. Haygarth recommends a continued stream of water from the spout of a tea-kettle, held up at a considerable distance, to be directed upon its surface. Excision, however, is to be had recourse to as soon as possible, and great care should be taken that the operation is performed effectually, and every portion exposed to the animal's teeth entirely removed. It is stated that on one occasion Mr. Hunter, after examining the piece cut out, thought he had removed all that was necessary, but on exploring the surface of the wound he found a hollow had been left which had been exposed to the dog's teeth, and which could only have been discovered after the operation. (*Trans. of Med. Soc.*) This circumstance indicates not only free excision, but a careful examination of the wound afterwards. Many practitioners think that caustic is alone sufficient to destroy the virus, and various remedies of this class have been recommended, as the actual cautery, the nitric, sulphuric, and hydrochloric acids, potassa fusa, nitrate of silver, butter of antimony, &c. Mr. Youatt prefers the nitrate of silver, as it produces a hard, dry, and insoluble eschar, whereas most of the others produce a soft or fluid mass in contact with the skin in which the virus is suspended, so that re-inoculation may be accomplished. He considers the lunar caustic also, when sharpened to a point, may be applied with more certainty to every recess and sinuosity of the wound. He has operated in this way on 400 persons, and on himself four times after bites from dogs decidedly rabid, and the disease has not appeared. He recommends also that, after the part has been destroyed by the caustic, the wound should be healed speedily, in the mildest manner. In this respect he is opposed to the practice advised by several German physicians, who, by the application of stimulating substances, keep up a state of suppuration for some time. L. M. Axter, senior surgeon at Vienna, applies a blister over the wound, and afterwards dresses it with Pulv. Lyttæ, or some stimulating lotion, for six weeks. He gives also a grain of Pulv. Lyttæ and six grains of Canc. Ocul. internally for six days. During a period of twenty-seven years, no patient thus treated had been brought back to the hospital labouring under the disease. Dr. Hausbrand of Braunsberg employs general bleeding, and makes deep scarifications of the

wound, which he washes with salt and water, after favouring the flow of blood as much as possible. He then applies an ointment of Ung. Basilicum and Pulv. Lyttæ, so as to keep up a discharge for three months. He also gives camphor and opium internally for the first three days. Eleven persons bitten by dogs actually rabid escaped after this treatment. Dr. Wendt of Breslau, besides keeping up for six weeks suppuration in the wound by means of Pulv. Lyttæ and irritating applications, employed mercury internally, so as to produce salivation: 180 persons were admitted into the Breslau hospital, of whom half had been bitten by rabid dogs, or supposed to be so, and two only died. All these methods of treatment are infinitely more painful and not so effectual as excision of the part, which we consider ought invariably to be done, whenever the situation of the bite will allow of it; and if not, the nitrate of silver, as recommended by Mr. Youatt, should be well-applied, and the wound enlarged if necessary, in order to allow the cauterisation of any sinus or recess on its surface. The application of a small cupping-glass over the bitten part has been recommended by Dr. Barry, and after excision this practice may be useful. Dr. Good advises the application of a tight ligature a short distance above the laceration, which may also be used. Amputation has been thought warrantable in some cases by Mr. S. Cooper, when a limb has been so severely lacerated, that complete excision of the parts is almost impossible or very dangerous. In cases where the smaller bones have been injured, this operation should be performed.

Dr. Marochetti considers that the rabid virus appears in the form of small pustules under the tongue, at each side of the frænum, from the third to the ninth day, and that the prophylactic treatment essentially consists in opening and cauterising them within twenty-four hours after their formation. He also advises that the mouth should be washed with a decoction of the genista tinctoria, of which the patient should drink a pint and a half every day for six weeks. (*Hufeland's Journal*, March, 1824.) In addition to several cases reported by himself, this plan has apparently succeeded in some cases given by Salvatori and Rossi. In ten cases however, in which this treatment was adopted by Majistal, five died, which is a very large proportion: probably more would not have been affected if nothing had been done. When these pustules are present, it will be well, as a precautionary measure, to open and cauterise them, but in numerous cases which have been carefully examined they could not be found. It has been supposed that the extremities of Warton's ducts have not unfrequently been mistaken for them. Washing the wound with oxymuriatic acid has been recommended by Wendelstadt and Brugnatelli, and for a short time this remedy was much thought of, but it soon fell into neglect. A case mentioned by Dr. Johnson died of the disease, although excision was practised seventy hours after the infliction of the bite, and the wound washed with oxymuriatic acid.

It has been supposed by Dr. A. T. Thomson, that the virus remains latent in the wound, and produces no evil effect until a peculiar state of the constitution favours its action. It is of course impossible to determine the truth of this theory, but the practical point to be derived from it is, that excision, even some time after the bite has been inflicted, may be useful. Jolly tells us that M. Recamier opened the cicatrices which were tumefied in an individual who had been bitten by a rabid animal fifteen days before, and cauterised them with the crystallised nitrate of mercury. Baths and diaphoretics were also employed, and the patient escaped the disorder, while another person who had been bitten by the same rabid animal, at the same time, perished from hydrophobia. A case is related by Professor Rush, where excision was performed thirty-one days after the bite, even after the hydrophobic symptoms had appeared, and still the patient's life was saved. Dr. Harder relates a case in which, five months after the bite, and eight weeks after excision, hydrophobia appeared, but another excision and cauterisation saved the child. In two weeks the symptoms again returned, and a pale and painful excrescence formed in the bottom of the wound. This was excised, the nitrate of silver applied, and

recovery took place. (*Petersburgh Med. Trans.*, vol. i. p. 170.) These are undoubtedly strong cases in favour of excision or the cautery, some time after the reception of the bite. The longest period at which it may be prudent to have recourse to such a proceeding is undetermined; but we should not hesitate to advise it any time before the fortieth day, if the animal was proved to have been rabid. The cases above alluded to also render it warrantable to excise the part whenever pain or swelling commences in the wound.

Knowing that mental agitation is a powerful exciting cause of the disorder, particularly when the individual is aware that the animal from which the bite has been received is in a rabid state, every means should be taken to tranquillise the mind, and remove imaginary terror. If an individual has been bitten by a dog supposed to be rabid, but which is not so, the animal should be exhibited to the sufferer; but if it have been destroyed under the unfounded apprehension, it will be well to cauterise the wound, and use the same methods as if the animal had been decidedly rabid.

Experience has sufficiently proved that all internal remedies, with a view of preventing the accession of the disease, are unworthy of confidence. Considerable doubts must always exist even with regard to the utility of local prophylactic treatment, so long as the great majority of individuals bitten escape without remedies of any kind having been applied, though there are few physicians who would not recommend, and few prudent individuals who would not submit to it.

2. *Curative treatment.* The result of experience has proved, that no mode of treatment hitherto adopted is capable of arresting the disease when once fully established. A few cases of recovery indeed have taken place, but the remedies which were supposed to have effected these, have failed so frequently in other instances, that it may be doubted whether such recoveries are to be attributed to the power of medicine. Of this the reader will judge from the following account of the effects which various therapeutic means have produced.

Sedatives have been most extensively tried with a view of overcoming the nervous excitement. Opium in particular has been largely given, and in all forms without success. Dr. Vaughan gave 57 grains in fourteen hours, besides half an ounce of laudanum in an injection, and Dr. Babington gave 180 grains in eleven hours. (*Med. Records and Researches*, p. 121.) Both cases died. Dupuytren injected the gummy extract with the like ill success. Dr. Booth recommended that 24 minims of the solution of acetate of morphia mixed with 3 ij of distilled water should be introduced into the cephalic vein, and repeated at intervals of ten minutes if no effect were observed. (*On Hydrophobia*.) Dr. Brundreth tried this plan, but with only temporary alleviation. (*Edin. Med. and Surg. Journ.*, No. lxxxii.) In another case Dr. J. L. Bardsley did not find it produce any benefit whatever. Dr. Ward advises opium frictions, which in some instances have occasioned temporary abatement of the spasms. Schmidt, Richter, Munch, and Brera, have administered belladonna, but unsuccessfully, when the disease has been perfectly established. The latter writer prescribed it in combination with mercury to the extent of 3 iij of the powdered root daily, and has published several cases in which it appeared to prevent the attack, even when the early symptoms of the disease were present. (*Mem. Soc. Ital. Scienza Mod.*, tom. xvii.) In the hands of other physicians, however, it has entirely failed. Prussic acid produced only temporary relief in Dr. A. T. Thomson's case, and in several other instances it has been found inert. Tobacco was used by Mr. Sawrey with advantage, and has been found beneficial in relieving the spasms of the muscles of the throat. As we have observed in the treatment of tetanus, it is a most powerful means of overcoming extreme nervous excitement, and seems worthy of further trial. An infusion of 9 j of the leaves in 3 viij of water, given in the form of enema, is the best method of administration. Cold affusion, energetically applied, is a powerful sedative, and has been employed, though with temporary benefit

only. In a case given by Dr. Bardsley, it relieved the burning heat of the skin. Stramonium, acetate of lead, warm baths, &c. have been used without success.

Bloodletting has been recommended by Mead, Boerhaave, Poupart, Fothergill, Nugent, and others; and has been performed to a great extent with occasional success. Dr. Innes took 116 ounces in four days: this large bleeding produced the greatest possible degree of prostration, but the patient recovered. (*Med. Essays and Obs.*, Edin. vol. i.) Symon (*Edin. Med. and Surg. Journ.*, vol. ix. p. 24.), Shoolbred (*Ibid.*, p. 30.), Wynne (*Particulars of the successful Treatment of a Case of Hydrophobia, &c.*), Burton (*Phil. Mag.*, Aug. 1805), and Vogelsang (*Med. Repos.*, vol. iv. p. 500.), bled to fainting with great success. Dr. Shoolbred recommends that the venesection should be performed in an early stage of the disease, and from a large orifice. Other instances are recorded, in which this treatment was followed by recovery; but in others it has failed in preventing the fatal termination. Rutherford, Parry, Bosquillon, and Troillet, have used bloodletting without beneficial result; the latter even thinks that the cases spoken of by Shoolbred were not cases of hydrophobia; and Mr. S. Cooper and Dr. J. L. Bardsley appear to coincide in this opinion. From the published results of this plan of treatment however, when employed at an early stage of the disorder, it appears to have been more beneficial than any other; and in certain cases, where the vascular excitement is much increased, and the constitution robust, may be adopted with every hope of success.

Stimulants and tonics have been given with a view of supporting the system against the prostrating effects of the spasms. Dr. Good was of opinion that the disease wears itself out in six or seven days, and that if the constitution can be supported beyond that time, the patient will recover. For this purpose, the different preparations of ammonia, camphor, assafoetida, castor, and other stimulants, have been largely employed. Musk has been thought by some to be useful, and may be given in large doses combined with opium and belladonna. It can, however, in no way be depended on; when conjoined with cinnabar, and about four ounces of arrack, it forms the Pulv. Cobbii or Turgiensis, which had a short-lived reputation for the cure of this malady.

Electricity and galvanism have been employed occasionally, with temporary benefit. Strychnia and the nitrous oxide gas were given in a case by Dr. Bardsley, but with little apparent effect. Carbonate of iron has been administered by Dr. Elliotson, and the mineral tonics by Dr. Bright, but without effect. The latter also recommends diffusible stimuli, and an injection of the Tinct. Ferri Mur. into the rectum. Acids, particularly the oxymuriatic and acetic, have been used and recommended, both as preventive and curative remedies, by Previtati, Agliatelli, Ancelli, Narcissi, and Brugnattelli (*Giornale di Fisica*, 1821). Nitrate of silver, plunging in the sea, hydrochlorine, sulphate of quinine, turpentine, and other remedies of this class, have been given, and found useless.

Mercury has been extensively employed by numerous practitioners. It was first recommended by Dessault, and afterwards by James, Kaltschmid, Du Choisel, Andry, Sebig, Königsdörfer, Walther, and others. Its beneficial effects are wholly denied by Frank, Girtanner, De Moneta, Raymond, and several other writers, and experience has proved it has little power in controlling the symptoms. Arsenic has been given by Dr. Marcet, combined with opium and iron, without benefit.

Of sudorific remedies, sweating by means of heated air has been recommended, but the time necessary to produce any effect on the system by these means is apparently hostile to its use. Diuretics have been highly extolled, especially cantharides, which has been employed for many ages in this disorder, and has been much praised as a prophylactic, by Axter of Vienna. Emetics have been occasionally given. Dr. Satterly thought them advantageous in a case in which they were employed by him. (*Med. Trans. of the Coll. of Phys.*, vol. iv.) Purgatives should be given to procure the necessary

alvine discharges, but do not appear to have been much relied on by practitioners.

Injection of warm water into the veins has been tried by Magendie, from his having observed nervous debility produced in animals which had been subjected to it, and that the fluid parts of the blood were diminished by the impossibility of taking fluids, and the great cutaneous and pulmonary transpiration. A pint of water heated to 30° Réaumur was injected into the arm of a man labouring under advanced and violent hydrophobia. Immediately after the operation the patient became tranquil, and the pulse fell in twenty minutes from 150 to 80. The spasms ceased, and the individual drank a glass of water without difficulty. He continued to improve until the fifth day, when swellings and acute pains in the wrists, knees, and elbows, appeared, and an abscess formed in the leg, occasioned by the broken points of two lancets, which remained in the foot, from former unsuccessful efforts to bleed. He died on the ninth day. The swollen joints were found filled with pus, and it is probable these secondary purulent deposits were the cause of death. Dr. Pearson recommended the injection of warm water in small quantities, impregnated with narcotic substances, into the veins, in order to relieve the spasms which prevent deglutition, followed up by cathartics, antispasmodics, the mineral and vegetable tonics, and sponging the body with cold water and vinegar.

Tracheotomy has been proposed by Mr. Mayo as an expedient in this disease. Dr. Hunter speaks of two cases benefited by running.

Several other remedies, supposed to act as specifics, have been employed. The ash-coloured liverwort was formerly so popular, as to be admitted into the London Pharmacopœia of 1721, under the name of *Pulvis Antilyssus*. The thalictrum flavum and angustifolium, and the delphinium consolida, are plants which were considered specific in some parts of Russia. (*Med. Repos.*, vol. ii. p. 153.) The guaco juice has been recommended by Sir Robert Kerr, but has been found inert in several cases. In America, the sartellaria laterifolia has been extolled by Dr. Spalding. The bite of a viper has been tried in some cases, with the idea that the venom of this animal would counteract the rabid virus. (*Dict. des Sciences Méd.*) The alyssa plantago, ophiorrhiza mungos, genista tinctoria, have been praised, as well as phosphorated water, soap lees, and other remedies, which are now abandoned.

In the midst of so many remedies which have been lauded by partisans, and in turn found to be useless — with a knowledge that the most powerful drugs are apparently inert — overwhelmed with the sad conviction that the learning and talents of the most experienced and energetic physicians have utterly failed in arresting the progress of this dreadful malady, the practitioner, when called upon to act, must still respond to the awful question, — What is to be done? It is in such a situation only that he can experience the benefit of having studied the whole train of nervous diseases, of being able to detect and appreciate the analogies and dissimilarities which exist between each respectively, and of having deduced from the whole such general principles, as will enable him to act conscientiously in every case, as far as the present state of the art will permit. In hydrophobia therefore, as in tetanus, and several other nervous disorders, no exclusive line of treatment should be followed. If the patient exhibit signs of plethora, be strong, of a vigorous constitution, and there be symptoms of increased vascular excitement, venesection, cupping, or the application of leeches to the occiput or back of the neck, and antiphlogistic remedies should be actively employed, so as to make an impression upon the nervous system. But if there be evidence of anæmia, and general depression of the vital powers, stimulants and tonics are indicated, and should be used energetically. With a view of overcoming the spasms, the tobacco enema, or cold affusion, may be had recourse to according to circumstances; and the same kind of treatment should be persevered in, as has been recommended for acute tetanus. (See TETANUS.)

NEURALGIA.

Definition. — Symptoms. — Varieties. — Diagnosis. — Causes. — Nature. — Treatment.

THE term Neuralgia (derived from *νεῦρον*, a nerve, and *ἄλγος*, pain), is applied to a painful affection in the course of a nerve, not necessarily referrible to inflammation or to any appreciable organic change. The pain is in some instances confined to the trunk of a nerve, in others extends to the branches, and occasionally proceeds from the branches to the trunk. It is sudden in its onset, often commencing with, rather than acquiring by degrees, its full intensity. The patient is usually at a loss for words fully to describe the suffering, but often speaks of it as shooting, stabbing, or scalding. The pain is in most instances aggravated by a slight touch, but relieved by firm pressure. It may be intermittent, remittent, or without a distinct interval. Intermission is a more frequent characteristic than is usually supposed, and it commonly attends neuralgia from mechanical injury. The attack is often ushered in by numbness, or a sensation of creeping or pricking in the part affected; and its cessation may be preceded by itching. Exalted sensibility of the part, muscular agitation, cramp, and even tetanic stiffness, may follow. The phenomena are in some degree diversified according to the peculiar function of the suffering organ. In the intervals between the paroxysms, a sensation of obtuse pain or numbness may be experienced, or there may be perfect freedom from all uneasy feeling. The accessions gradually become more and more violent, and the intermissions less defined, till at last the patient enjoys no immunity from suffering, except when under the stupifying influence of sedatives. A severe case of this description probably occasions the greatest degree of anguish to which the human body is liable; and in its full extent of duration and intensity, is perhaps "beyond the endurance of human fortitude."

Hippocrates and Galen appear to have confounded *tic douloureux* with tooth-ach, and to have described other neuralgic affections as varieties of gout and rheumatism. André, in 1756, in a work on a very different subject, introduced remarks showing his knowledge of their separate character. Cotunnius, in 1770, specified the discriminating marks between gout and sciatica, and described with considerable accuracy the cubito-digital variety of neuralgia. His observations were followed by those of Fothergill, Pujol, Thouret, and Fortsmann on *tic douloureux*. But the views entertained of the affection were very incomplete until Chaussier, in 1802, first introduced the name neuralgia, accurately described the disorder as affecting the nervous cords, and gave a faithful account of several varieties. Since the publication of Chaussier's remarks, the disease has attracted a degree of attention, in some degree commensurate with its importance. It is now generally allowed not to be limited to any particular part of the body; and evidence is continually accumulating in support of the opinion of M. Jolly, that as wherever there is blood there may be inflammation, so wherever there is a nerve, there may be neuralgia. We cannot deny even to the ganglionic system of nerves, a liability to exalted sensibility. Cruveilhier has shown by experiment, that spasmodic cough may be produced by irritation of the pneumogastric nerve. Various affections, such as asthma, dyspnœa, pertussis, and nervous vomiting, have been referred to a similar condition by Pinel, Delens, Bland, and Lobstein. Laennec attributed *angina pectoris* to a similar source. Legond has written an interesting monograph on *colica pictonum*, describing it as a neuralgic affection of the sympathetic nerve. Gastrodynia, and various analogous disorders, have also been traced to a similar condition by Teale, Marshal, Griffin, and others, in our own country. On these

interesting subjects it may be sufficient to mention, that such affections of ganglionic nerves are generally attended with altered or increased secretion of associated organs; that they are more frequent in women; and that the exacerbations, according to Jolly, instead of occurring, as in ordinary neuralgia, chiefly in the evening, appear at night or early in the morning. There is no reason to believe, that any of the nerves of the cerebro-spinal system, from the root to the ramifications, enjoy immunity from neuralgia. A severe variety of headach (termed *cerebralgia*) appears to depend on a neuralgic condition of the membranes of the brain. A similar state of the membranes of the spinal cord occasionally exists, and may be associated with alterations of the voice, spasm of the œsophagus, cough, dyspnœa, vomiting, colic, cramp, &c. (*Nouv. Biblioth. Méd.* 1827. Gassaud and Costa.)

The subcutaneous nerves, especially those of parts provided with numerous muscles, are, however, most subject to the disease; and the most frequent seat of the intense form is the head and face, in consequence of the number and sensitiveness of the nerves in this situation, as well as their superficial arrangement, and perhaps, also, from their intimate connection with the sympathetic, and consequent susceptibility of impression from conditions of the abdominal viscera. Bell and Shaw have questioned the liability of the portio dura to neuralgia, but there is reason to believe that its branches are occasionally affected, although much less frequently than those of the fifth pair of nerves. In forty cases related by Bellingieri, thirty-eight affected the fifth pair; only two the portio dura. It is the third branch of the fifth pair which is most liable to this distressing complaint in its most intense form; and to this variety, from the suddenness of its onset, the term *tic douloureux* was originally given by André. It constitutes the *dolor faciei* of Fothergill and Fortsmann, the *dolor faciei typico caractere* of Siebold, the *neuralgia facialis* of Chaussier, *neuralgia spasmodica* of Kerrison. It is denominated *trismus clonicus* by Ackemann, *trismus dolorificus* by Sauvages, *hemisrania idiopathica* by Darwin, *rhumatismus canerosus* by Vogel, *febris topica* by Van Swieten, *ophthalmodynia periodica* by Plenck, and by others *prosopalgia*, *dolor faciei atrox*, &c. When the supraorbital branch is affected, we generally find redness, sensibility, and pain of the eye, shedding of tears*, swelling of the veins, and throbbing of the arteries in the neighbourhood. The attack generally comes on in the evening, and lasts most of the night: sometimes the affection is confined to the eyeball, constituting a severe variety of neuralgia, which has been well-described by Mr. Middlemore: the pain is usually intermittent. There is great intolerance of light, especially during the paroxysms, and the pupil is in most cases contracted. When the *suborbital* nerve suffers, the pain may be confined to the eyelid, or it may extend to the dental branch, involving the maxillary sinus, palate, base of the tongue, and side of the face, and through the communications of this nerve with the portio dura, convulsive actions of the lid, cheeks, and upper lip, may be produced. Shedding of tears and excretion of nasal mucus are common accompaniments†, but sometimes these parts are remarkably dry.

When the *maxillary* branch is the seat chiefly implicated, the teeth or their sockets, the sides of the tongue, the lips, and chin, suffer. This is said to be the least regular in its progress of all the varieties of facial neuralgia, and to affect the right more frequently than the left side. When associated with trismus, or with lateral distortion of the face, the disorder may be more obstinate, but the pain is generally less severe. Sometimes the complaint is limited to a single nervous twig, as to the labial, dental, or palpebral; but in other instances it extends to the neighbouring parts: it is generally confined to one side, but sometimes attacks both sides together, or passes alternately from one side to the other.

* It is remarkable that cases which have involved the lachrymal glands often leave a liability to shed tears even during sleep and in the absence of emotion.

† Dr. Macculloch on one occasion observed a pint of mucus to distil from the nostrils in a short space of time.

In all these varieties the first attacks of pain may be so slight as to attract little attention, but their severity gradually increases. The duration of the paroxysm may be only a few seconds, and seldom exceeds a minute. Sometimes repeated attacks occur in a few minutes, at other times the intervals are considerable. The suddenness of the pain stops abruptly any conversation in which the patient may be engaged; and rocking in his chair, or writhing with anguish, he places his hand on the face, which he beats, rubs, or presses. He knits the brow, compresses the eyelids, draws up the lips into a sardonic grin, and fears either to speak or to masticate. When the complaint has been long protracted the appetite fails, a feverish state arises, the patient obtains no rest, except under the influence of opiates, and sometimes becomes delirious from the violence of the pain.

The affection described by Itard under the name of *Otalgia*, and which is peculiarly apt to occur in infants and in children shedding the first set of teeth, evidently belongs to this class of disorders, differing from otitis in the lancinating and intermittent character of the pain and the absence of fever. The paroxysm is frequently accompanied with deafness, and, when existing in adults, otalgia often associated with facial neuralgia.

The *cervical* nerves have been occasionally affected with this disorder, in consequence of injury occasioned either by the application of leeches (*Nouv. Bibl. Méd.*, 1827), or from a wound received in the operation of opening the jugular vein.

Of the *intercostal* nerves, that which runs between the eighth and ninth ribs is most liable to suffer, particularly in women. A neuralgic condition of the *lumbar* nerves, constituting one of the most important varieties of lumbago, has been denominated *ilio-scrotal* and *spermatic*: the anus, spermatic cord, scrotum, and ureter, are the parts chiefly affected, and in women the vulva: the *cubito-digital* variety of neuralgia described by Cotugno and Chaussier is the most frequent to which the upper extremities are subject. The pain passes between the olecranon and tubercle of the humerus, and runs down to the forefinger and to that adjoining.

The *femoro-popliteal* variety (commonly called *sciatica*), is perhaps the most common, and the best known. The pain sometimes seems to arise from the ischiatic notch; at other times from the origin of the sacral nerves, some of the divisions of which it follows. It is particularly liable to occur in pregnant women, in consequence of the pressure of the gravid uterus. Neuralgia of the *plantar nerve* has been known to alternate with that of the facial.

These varieties have been mentioned as among the most frequent affections of single nerves, and it is unnecessary farther to extend the enumeration.

Parenchymatous, muscular, and membranous structures are also liable to be affected. Hepatalgia and hysteralgia may be mentioned as examples of neuralgia of parenchymatous tissue. The bruised feeling attending fever, and the muscular pains depending on atmospheric vicissitudes, are examples of muscular neuralgia. To the membranous variety may be referred some intensely painful affections of the pleura and peritoneum, occasional examples of wandering gout, and not a few of the affections of the periosteum, often attributed to syphilis or mercury. Neuralgic affections of the joints might be noticed as instances of membranous neuralgia, but they occur most frequently in persons subject to hysteria, and have therefore been described in the dissertation on that complaint. Some intermittent affections of the nostrils, bronchial tubes, and conjunctive membranes, as well as of the urethra, may be arranged in the same division. A tertian variety affecting the last mentioned part, has been described by Professor Fulci. Neuralgia of the rectum occasionally occurs: in a case described by Bushe, it existed only during the first three months of pregnancy. A neuralgic condition of the *skin* may present itself, sometimes as a symptom of internal disease, at other times as a primary disorder. The "*épidémie de Paris*," which occurred in the spring of 1828, and which is described by Chomel in the *Journal Hebdomadaire*, No. ix., affords

a remarkable example of cutaneous neuralgia: it began in persons previously healthy, with sensations of pricking, severe pain, and acute sensibility of the integuments of the hands and feet; subsequently the sensibility of the affected parts was diminished or abolished, but in most instances was gradually and spontaneously restored.

Herpes and other eruptions are occasionally preceded by pain of a neuralgic character.

Glandular organs sometimes suffer severely from the complaint. The liability of the lachrymal gland to the malady has been already noticed. Sir A. Cooper has accurately described neuralgia of the mamma, under the designation of "the irritable breast." It is almost confined to patients between the age of fifteen and thirty. Sometimes both breasts are affected, at other times only part of one. In cases of long duration the gland is sometimes slightly enlarged, but in most instances is not visibly altered. The pain darts like electricity into the part, shoots to the axilla, shoulder, inner side of the elbow and fingers, or passes by the sides of the body to the hip. There are alternate feelings of heat and cold in the part. The patient is unable to rest on the side affected, and the weight of the breast sometimes occasions intense pain. One or more lobes are exquisitely tender, and very severe pain, often of some hours' duration, is produced by handling them. Vomiting is sometimes induced by sympathetic disturbance of the stomach. The complaint may continue for months or years without intermission.

An interesting example of neuralgia of the kidneys has been described by Dr. Macculloch. It assumed an intermittent character, and the secretion of urine during the fit was more abundant than in diabetes.

When the testis is affected with neuralgia, some part of that organ, or of the epididymis, is exquisitely tender, so as to oblige the patient to rest in the recumbent posture, and on the side opposite to that affected. The increase of pain produced by pressure or motion, sometimes continues for a considerable time afterwards. Sympathetic vomiting is sometimes excited by the violence of the pain.

A variety of neuralgia depending on a small tumour involving the nervous structure, has been remarked by Camper (*Démonst. Anat. Pathol.*, lib. i.), Cheselden and Bisset (*Mem. of Med. Soc. of Lond.*, vol. iii.; *Med. Facts and Obs.*, vol. vi.), but was first fully described by Mr. William Wood (*Edin. Med. and Surg. Journ.*, vol. viii.), under the denomination of "painful subcutaneous tubercle." The pain occurs in paroxysms, lasting from ten minutes to two hours, gradually increasing in severity, and leaving a bruised feeling. The pain is increased by changes of atmosphere. It is also produced, or, if previously existing, is much aggravated by pressure. The complaint is most common in women, and in a case related by Dr. Bisset, was invariably more severe during pregnancy.

Angina pectoris is probably a neuralgic affection of some of the cardiac nerves, sometimes arising from mechanical irritation, occasioned by organic disease of the heart or its vessels; but this subject is still involved in uncertainty.

It may be questioned, whether any of the affections which have been designated *Gastralgia* and *Enteralgia* can be strictly considered neuralgic.

Diagnosis. The exquisite form of neuralgia is readily distinguished from every other malady by the nature of the pain, and by the suddenness of its onset. In less severe attacks, the situation of the pain in the course of a nerve is generally sufficiently characteristic. In neuritis there is decided tenderness on firm pressure, with heat, redness, and other signs of inflammation, and without the sensation of coldness, so common in neuralgia. It is, however, important to remember, that inflammation of a nerve may occasionally precede or accompany neuralgia.

The pain produced by otitis is less lancinating and intermittent than that of otalgia, and is not relieved by the introduction of anodynes into the ear. The

pain of common toothach is more constant, is increased by touching with a metallic instrument, and is often attended with swelling of the gums. But it must not be forgotten, that the neuralgic variety of toothach is by no means uncommon: it may attend or alternate with other forms of neuralgia, is produced by the same causes, and resembles them in the nature of the pain. The pain of rheumatism is usually gnawing, pungent, continuous, or remittent, while that of neuralgia is lancinating or thrilling, periodical, and often relieved by pressure.

Causes. Among the *predisposing* causes may be mentioned the nervous temperament, adult age, residence in marshy countries, intellectual exertion, moral emotions, and long continued watching. Dr. Baillie and others agree, that the disease has lately become more frequent than formerly; and although a more accurate diagnosis, by separating the disease from rheumatism, may have conduced to the apparent increase of frequency, yet there is good reason to believe, that the anxieties associated with a state of progressive civilisation have increased the prevalence of these affections. The question, whether one sex be more subject than the other to this disorder, must be considered as undetermined, André, Baillie, Samuel Fothergill, Sauvages, and Barnard, considering it more frequent in men, while Pujol, John Fothergill, and Hutchinson, regard it as more common in women. The observations of Thouret, however, strongly support the former opinion. He examined the question with considerable care, and found, that of the cases which fell under his observation, the proportion of men to that of women suffering from the complaint was as two to one. The disease may be induced by any cause which deranges the digestive organs, or which disturbs the balance of the circulation. Long fasting, or free bleeding for the cure of inflammation, may be followed by a paroxysm; occasionally, the opposite condition of plethora may produce it.

Of the *exciting* causes most commonly enumerated, viz. blows, fright, suppression of sanguineous discharges, currents of cold air and damp, the last is probably the most efficient. Of forty cases described by Bellingieri, two were attributed to fright, two to wounds, two to suppressed discharges, and thirty-four to damp. All the forms of the complaint prevail most in spring, and during easterly winds. Neuralgic ophthalmia is most frequently met with in places where intermittents are common: it is, for example, prevalent on the coasts of the Mediterranean, at Tripoli, and on the shores of Barbary, at Rome, Naples, and Florence, and at Valentia and Albaterra. In connection with the relation existing between neuralgia and toothach, it may be interesting to mention the observation of Captain Smyth at Villa Cidro in Sardinia, that the women who cultivate the marshy plain are noted for bad teeth, while those of the men who reside on the mountains are remarkably sound. Hæmorrhoids and stricture of the urethra sometimes induce a liability to neuralgic affections, particularly of the lower extremities.

Nature. The opinion of Cabanis and of many of the ancients, that the disorder depends upon an arrest of the nervous fluid, although founded on an assumption, has the support of many of the moderns, and is not without plausibility. Whatever may be the nature of the nervous influence, its proportionate distribution among the organs of sensation, motion, and intelligence, seems to be essential to the healthy state. Many phenomena are most readily explicable on the supposition of a change in the direction of the nervous energy. It is perhaps through the intervention of such a change, that pain and convulsion tend to counteract each other, while delirium and drunkenness may suspend both; but we pass from these speculative views to notice the appreciable lesions which have been found associated with the disease.

Cotunnus, Dr. Sayer, and others, have observed a gelatinous secretion under the neurilemma of affected nerves. Cirillo attached importance to thickening of this structure; a condition which was also observed by Mr. Earle in the portion of the ulnar nerve, which he removed in a case of neuralgia of the arm. Such appearances must, however, be allowed to be only occasional, pro-

bably dependent on long-continued disease, and more frequently associated with rheumatic affections than with true neuralgia.

Enlargement of the vessels of affected nerves is a much more frequent occurrence. It was described as an accompaniment of the complaint by Bichat and Van de Keer, and, during the late war, was frequently detected in those who had suffered from sciatica. It is probable that in cases of shorter continuance, such a condition may have existed, but have disappeared after death. We have often observed venous congestion about superficial nerves, affected with neuralgia. The necessity for a balance between the arterial and venous system to preserve the healthy condition of nerves, and the fact that these affections are often relieved by warmth, are favourable to the opinion that this congestive state may frequently exist. At the same time it must be acknowledged, that such a state does not appear essential, since in cases of long duration, examined after death by distinguished pathologists, such as Chaussier, Desault, Cooper, Andral, and Rousset, the nerve has been found in appearance perfectly healthy.

In several instances some irritating cause has been discovered between the part to which the pain is referred and the nervous centre. A case of fourteen years' duration is described by Mr. Jeffries, depending on irritation from a piece of china imbedded in the face, and which was immediately cured by the removal of the foreign body. Sir H. Halford, in his interesting essay on *tic douloureux*, has related a case produced by exostosis arising from a sound tooth, and has referred to cases in which disease of bony canals through which nerves pass, or spiculæ of bone pressing upon nerves, have been associated with neuralgia. In an example of *tic douloureux*, which occurred at the Richmond Hospital in Dublin, the gasserian ganglion was fibro-cartilaginous, and as large as a nutmeg. In some instances the irritation is communicated from distant nerves by sympathy, as in the case described by Mr. Lawrence, in which neuralgia of the thumb was occasioned by the pressure of a pivot tooth on the nerve of an old fang.

Various causes of irritation affecting any part of the cerebro-spinal axis seem capable of producing the complaint. Dr. Marshall has related some remarkable instances, in which aneurism of the aorta had occasioned absorption of the bodies of some of the vertebræ, and produced pressure on the spinal cord, but without occasioning any observable change in its structure. In one of these cases, in which the arch of the aorta was affected, and the bodies of the fifth, sixth, and seventh dorsal vertebræ were absorbed, the patient frequently suffered from a sensation, as though struck forcibly with the fist or by an electrical shock on the fifth, sixth, and seventh ribs of the left side, and afterwards felt as if burnt in that situation with a hot iron. In another case, in which the descending aorta was affected, similar shocks, followed by a burning sensation, were experienced to the left of the linea alba. It is worthy of notice, that, in both these patients, drawing a silk handkerchief, however lightly, over the affected parts from the mesial to the dorsal aspect, occasioned intense agony, whilst drawing the handkerchief in the opposite direction was not attended with suffering. Several other practitioners, particularly Player, Brown, and Teale, have traced an important connection between a morbid state of the spinal cord and various neuralgic affections; and we have witnessed some remarkable phenomena resulting from blows upon the back, favourable to the same view. In some of these cases there was an alternation of neuralgia with cutaneous eruptions of a scaly character. Alternation of the complaint with herpes has been noticed by Dr. Bright (*Reports of Medical Cases*), in a case of intercostal neuralgia, and by M. Jolly in the cubito-digital variety (*Dict. de Méd. et Chir.*); and M. Recamier mentions two cases of sciatica in which zona appeared, but in four days entirely vanished. This is not the place to adduce evidence of connection between certain cutaneous eruptions and affections of the spinal cord; but it may be advanced as a plausible opinion, that when there is disorder of many parts in succession, there is some focus of irritation,

and it is reasonable to suspect the medulla spinalis as the great medium of metastasis. Although the researches of pathologists have failed to prove that any organic change is necessarily concerned, yet we feel authorised to conclude, that some cause directly interfering with the functions of the brain or spinal cord, is generally present in neuralgia, and that the causes of the complaint commonly exert their influence through the medium of these organs.

Treatment. Few parts of the records of medical practice are more unsatisfactory than those which relate to the treatment of this distressing affection. The long list of remedies, alternately recommended and discarded, furnishes a forcible evidence of their inefficacy. External applications of every kind, tar, cantharides, and even the smoking entrails of live pigeons, have been successively employed. The internal use of every variety of anodyne and of numerous metallic salts, has led to repeated disappointment. Lentin honestly confesses, that of fourteen cases which he treated, he did not succeed in curing one. Dr. Baillie observes, that he has known medicine produce an intermission of some months or even a year, and the division of a nerve suspend the complaint for two years, but that he had not witnessed a case of permanent cure; and Dr. Fothergill closes his melancholy list of unsuccessful remedies with the remark, that we must look to the influence of moral agencies. Dr. Fothergill's observations on the subject of magnetism, a measure adopted in his day in the treatment of neuralgia, may not be without interest at the present time. His words are, "In some few cases where the disease was recent, and the pain slight, the use of magnetism certainly procured ease, but merely, I should conceive, by forcibly acting upon the imagination like the modern tractors and all such absurdities with which the credulity of the public is daily gulled and deservedly duped. Indeed, it is much safer and more prudent to ease people of their superabundant cash with a patent, than to dive into their pockets without one: the one practice is attended with riches and honour, the other with infamy and disgrace." It must be acknowledged that the power of the imagination over the complaint is often considerable. Dr. Macculloch, for example, has related a case which the gibberish of an old woman charmed away, after the failure of arsenic.

Although, from the effect of modern improvements, the disease is now found often to yield to scientific treatment, yet we have too frequently to deplore the inefficacy of remedies.

There can be no doubt that the probability of successful treatment must in a great degree depend on the accuracy with which we discriminate the peculiarities of the individual case, and adapt our remedies to them. With a view to this object, it will be important to distinguish the disease into the idiopathic and the sympathetic forms; the first depending on a primary derangement of some part of the nervous system, the second on derangement of some other organ.

In every instance it is important to examine the parts in the neighbourhood of affected nerves, and also to investigate the condition of the spinal cord. If any part of the spine be found particularly tender, it will generally be expedient to abstract a little blood from the neighbourhood, and subsequently to employ counter-irritation by means of blisters or tartar emetic ointment. If there be pain of head, flushed cheeks, and dizziness, the loss of blood will be desirable; and this measure will often convert irregular into regular neuralgia. Mr. Teale has related many cases, some of considerable severity, in which this plan proved remarkably efficacious. We have adopted the same treatment with similar success, and have occasionally derived great advantage from the subsequent use of spirit of turpentine in doses of 3j twice or thrice a day, especially in cases in which psoriasis had also existed. This treatment proved rapidly efficient in a case of hysteralgia of some years' duration, recurring daily in severe paroxysms, in which tenderness and puffiness, previously unsuspected, afterwards ascertained to have been produced by a blow, existed

over the upper lumbar vertebræ. When concurrent causes of irritation are removed, such as constipation of the bowels and torpor of the liver, it will be important to ascertain whether the attacks partake of an intermittent character. Should this be the case, whether the pain be superficial or deeply seated, attended or unaccompanied with fever, sulphate of quinine will be found the most effectual remedy. It may be advantageously combined with anodynes: those of a milder character, as the tincture of henbane, occasionally prove sufficient, and should first be tried; but if they prove inefficient, the sedative solution of opium, or the black drop, should be substituted. Dr. Bardsley prefers the acetate of morphia to all other preparations of opium, and has related several cases of neuralgia cured by that remedy alone. (*Hospital Facts and Observations.*) Small doses of quinine often prove adequate to the relief of the symptoms, but they sometimes require to be increased even to the extent of a scruple or half a drachm several times a day. An interesting case illustrative of this fact, and having a manifest relation to intermittent fever, is described by Sir B. Brodie in one of his lectures on nervous affections.

In cases not characterised by distinct intermissions, the sesquioxide of iron is a more suitable remedy, and is perhaps peculiarly efficacious when there is a deficiency in circulating energy. There is probably no medicine, the claims of which to attention in the treatment of common neuralgic affections are founded on so many recorded instances of success; and the liberal manner in which Mr. Hutchinson published his observations on the subject, affords one of the many examples of disinterested devotion to the public welfare of which the Medical Profession may be justly proud. In some instances a dose of ten or fifteen grains several times a day will be found sufficient; in others the quantity may be increased even to half an ounce for a dose. We are disposed to consider arsenic as inferior both to quinine and iron in the scale of remedies for neuralgia, and to regard it as less safe and less effectual; it will, however, occasionally succeed after the failure of those medicines, where we wish to produce an alterative effect rather than to make a strong impression on the system.

The pills of Meglin require some notice in consequence of the importance attached to them by some French physicians. They consist of equal parts of oxide of zinc, powdered valerian, and extract of henbane. Meglin in one case gave forty pills night and morning; but in others only three could be borne twice a day. Many instances of their successful employment are recorded in the French periodicals. (*Journ. de Méd. Chém. et Pharm.*, t. xxii. xxvii.; *Biblioth. Méd.*, t. xlviii.) Considerable expectations were once entertained from the trial of strychnia; it has, however, been given to the extent of producing subsultus tendinum without any relief to the symptoms. Anodynes must be regarded rather as remedies of a symptom, than of a disease; we have rarely found them productive of more than temporary advantage, although we have reason to think that belladonna deserves a careful trial, and, if well-prepared, may prove of considerable value, the *Liquor Belladonnæ* (*Battley*) having occasionally appeared to be productive of permanent benefit.

Extract of stramonium, in doses of from half a grain to two grains three times a day, has sometimes given relief, but at other times it has been carried to the extent of producing narcotism without any advantage. (*Med. Chir. Rev.*, vol. xxii. p. 72.) Dr. Fott (*Lond. Med. and Phys. Journ.*, Sept. 1832) has employed the tincture with good effect in doses of fifteen minims every three hours. Mr. Lawrence prefers conium to all other narcotics in this complaint (*Med. Chir. Rev.*, vol. xxii. p. 565.); and other authors have recommended extract of aconite. There can be little doubt that the preparations of opium are decidedly the most entitled to reliance, and when introduced into the rectum they are at once more safe and efficacious than when administered by the mouth. The mineral waters are entitled to great attention as remedies in this complaint, and the Carlsbad has been the most frequently successful. It appears not only to correct the condition of the liver and other digestive organs, but also

to improve the state of the nervous structure : many obstinate cases have recovered under its use. It is scarcely necessary to observe, that the advantages of the water may now be secured at the German Spa at Brighton, almost as effectually as at the natural spring. The experiments of Flourens, showing the production of congestion of different parts of the nervous system by different remedies, encourage us to hope that means may eventually be discovered, of acting on the nervous functions without disturbing other processes.

External applications of various kinds have been strongly recommended. Mr. Scott sometimes employs a combination of mercurial ointment, and tartarised antimony — in other cases an ointment of iodide of mercury ; but the irritation produced by these applications is considerable, and the benefit derived doubtful. Blisters have been occasionally applied, but the opinion of Heberden, that they are calculated to aggravate superficial neuralgia, is supported by recent experience, and their employment is now almost confined to the treatment of sciatica. The application for a few minutes of lint dipped in strong solution of ammonia, covered so as to prevent evaporation, is recommended by Dr. James Johnson. The production of pustules by means of friction with croton oil has been occasionally useful, as, for example, in some cases of sciatica related by Andral.

The application of the moxa proved useful to patients treated by Dr. Duncan and others in this country, and also by several French practitioners. Most of these cases, however, were affections of the sacro-ischiatic nerve. In ordinary neuralgia little could be expected from the remedy unless severe spinal irritation were present, and the moxa be applied near the affected part of the back.

Electricity has been occasionally recommended, but Dr. Macculloch tried it in vain for many years, notwithstanding all the facilities afforded for the experiment by a military hospital.

During the last thirty years, the Indian practice of acupuncture has been sometimes adopted in this country ; and Dr. Osborne (*Dub. Med. Journ.*, vol. xii.), who regards the disease under consideration as a modification of paralysis, has made many experiments on the subject, which lead him to be sanguine respecting the efficacy of this measure in many cases of neuralgia, and to consider it as the most valuable addition made of late years to European practice. In sciatica, Dr. Osborne rarely found acupuncture fail to relieve, excepting in cases in which, from the aggravation of the pain on coughing, there was reason to apprehend disease of the theca vertebralis or in the pelvis. The experiment is perfectly safe, since it appears from the experiments of Cloquet, Bretonneau, and Carraco, that well-tempered sewing-needles may be thrust with impunity through any structure of the body, through the liver, lungs, intestines, or arteries.

Various external applications of a soothing character have been used with uncertain advantage. Distilled cherry-laurel-water has been occasionally found an efficacious lotion. Dr. L. Broglia del Persica has given an account of its successful employment in ten cases. (*Annali Univers. di Med.*, 1832.) Its use is perfectly safe and easy, and it deserves a more extended trial. The application most depended on by many of the French practitioners, is the cyanuret of potassium : it was particularly recommended by Buttigny, Roubiquet, Villaumy, and Bally ; and Lombard of Geneva has given a favourable report of its virtues. He sometimes employs an ointment containing from two to five grains of the cyanuret to the ounce of lard, but prefers a lotion containing from one to four grains in an ounce of water. He considers it inefficient in sciatica, and in neuralgic cases complicated with inflammation. The few experiments made with the remedy in this country have not prepossessed practitioners with any very strong opinion of its efficacy.

A lotion composed of equal parts of prussic acid and solution of acetate of lead is sometimes useful, and, in the less exquisite cases, relief may often be derived from a solution of extract of belladonna, or of opium in camphorated oil. Sprinkling half a grain or a grain of morphia on a blistered surface is

often found productive of great relief; but caution must be observed in the employment of a remedy, which, even when applied in the endermic method, is capable of producing a very powerful effect upon the system. Some French physicians have introduced the remedy by inoculation into the affected part with advantage: it may be mentioned, as an interesting result of this procedure, that a tubercle surrounded by an areola is formed upon each puncture. The application of steam by means of a suitable apparatus to the part affected is strongly recommended by Dr. Macculloch, who has found it invariably alleviate and often remove pain.

We have made occasional trials of veratria ointment, and concur with those who believe it to be an application of little value in neuralgic complaints. We entertain, however, a different opinion of aconitine, having found it, in the proportion of one or two grains to two drachms of lard, peculiarly effectual in arresting the pain in several instances of cubito-digital and frontal neuralgia. Some cases illustrative of its utility, have also been narrated by Mr. Skey (*Med. Gaz.*, Nov. 1836), the one of nine, the other of eight years' duration. Although we cannot expect any local application to effect a radical cure, yet the arrest of pain has advantages beyond those of mere temporary relief. Pain increases the sensibility of a nerve; the sooner, therefore, the habit can be overcome, the greater is the success likely to be produced by measures adapted to the constitutional condition.

The practice originally recommended by Galen, of dividing nerves or amputating limbs affected with neuralgia, after the failure of remedies, although on a few occasions successful, as in the cases treated by Kelson, Cooper, Thomas, and Cruickshanks, derives no support either from philosophical reasoning, or from the average results of the experiment. Some very affecting cases are recorded, in which a succession of amputations was resorted to in vain. Whilst, on the other hand, instances in which a proposed operation has been deferred, have spontaneously recovered.

When, as often occurs, many parts are involved in the complaint, the presumption for its constitutional origin is strong; and the disease being in common instances so often connected with the condition of the nervous centre, we can readily understand, that although a severe operation may by the violence of the shock suspend the affection, yet that it is not a measure calculated to insure permanent relief.

Treatment of Sympathetic Neuralgia. The most important of the causes of sympathetic neuralgia are derangements of the digestive organs, hysteria, and rheumatism.

1. A slight degree of gastric or intestinal irritation in persons of nervous temperament, will sometimes prove sufficient to induce neuralgic affections, which in the commencement may be slight and variable in their seat, occurring some times in a tooth or in the face, at other times in an extremity, and recurring under the influence of any cause which depresses the strength or disturbs the stomach, as fatigue, anxiety, fasting, or injudicious diet. The tongue in such cases often presents elevated red papillæ; flatulent distension of the abdomen is apt to occur after food, especially if digestion be interfered with by anxiety or study. These cases require mild and careful treatment. Powerful remedies, whether of the purgative or tonic class, aggravate the local as well as the general irritability, while opiates give only temporary relief, and add the inconvenience of their own effects to the original malady. A considerable proportion of such cases, neglected or violently treated, gradually assume the exquisite form, and become unmanageable; but if, on the contrary, the diet be judiciously regulated, and be nourishing, unstimulating, and taken at regular intervals; if the powers be husbanded, and a due proportion of sleep insured; if acidity be corrected by small doses of soda or magnesia; and if other symptoms, as they arise, be met with prompt and mild measures, the neuralgic tendency will generally be overcome.

In paroxysms of pain, associated with the condition just described, even

after the failure of laudanum, we have known decided relief produced in a few minutes by the administration of two or three grains of carbonate of soda. The importance of these facts is here peculiarly insisted on, because the habits of medical education are perhaps calculated to engender a bias in favour of the employment of powerful remedies. In the management of acute inflammatory diseases, such a bias may be safe and useful; but in the treatment of nervous affections, which constitute an increasing proportion of the cases which fall under our care, the secret of success will probably be found rather in the accurate adjustment of mild measures, than in the bold adoption of heroic plans. In the instances above referred to, the successive employment of quinine, arsenic, mercury, iron, and other powerful medicines, too often produces an almost incurable condition of the intestinal mucous membrane, while the original disorder remains unmitigated; and the administration of opium for the purpose of temporary relief becoming more frequent and excessive, an alternation of torment and torpor constitutes the remainder of a life, at last terminated by apoplexy, the production of which these measures may accelerate. Doubtless the vacillation of patients impelled by the urgent desire for immediate relief frequently to change their medical attendant, by depriving any one plan of treatment of a fair trial, materially contributes to these lamentable results.

A more confirmed derangement of the digestive organs, attended with depraved hepatic secretion, and a deposit in the urine of the brickish red sediment of purpurate of soda, is sometimes connected with neuralgic maladies. There is not necessarily any peculiarity in the nature of the pain in this or any other variety of symptomatic neuralgia, but when depending on chronic disturbance of the digestive organs, the complaint perhaps affects some situations more than others, especially the head, shoulders, and hypochondriac regions, the treatment of these cases resolves itself into the careful adoption of measures adapted to the peculiar form of indigestion. But the occasional use of mercurial pill, followed by a combination of bitters and aperients, will generally prove useful; and when there is much nervous pain of the head, a combination of valerian and iron will sometimes give relief. In other instances, in which the derangement of the digestive organs is more protracted and severe, the urine deposits the white earthy sediment of the triple phosphates, and the general strength is extremely reduced, a complete change of scene and habits will often be found essential. The diet may be as generous as the digestive functions will admit; and wine, though generally inexpedient, will sometimes be desirable. Mr. Carmichael, who suffered severely from this form of the complaint, in the interesting detail of his own case, mentions having derived benefit from the use of the Lafitte and Château Morgau claret. He also had recourse to the baths of St. Sauveur and Barèges, which are well-deserving of a trial.* Active exercise must not be ventured on too soon. In cases characterised by torpor, rather than irritability of the intestines, a decided impression by means of purgatives will sometimes prove useful. In support of this opinion it may be mentioned, that Sir Charles Bell administered small and repeated doses of croton oil in several obstinate examples of neuralgia with great success. When the disease has been seated in the hip or scrotum, he has frequently observed a scalding sensation of the lower extremities exceedingly like what is often felt during the passage of a purgative through the intestines; and he has always regarded this symptom as a sufficient indication that the source of the complaint is in the bowels.

2. The second division of sympathetic neuralgia, namely, the hysterical, most frequently affects the intercostal nerves, especially on the left side, the hip and thigh, and the inner part of the knee joint. This subject having been

* Some of the effects of the internal use of the Barèges water may be obtained by taking in the morning 60 grains of tartarised soda and 20 of the bicarbonate with 2 of sulphate of iron, in a pint of warm water.

already treated of in the article *HYSTERIA*, does not now require a lengthened notice. It will be sufficient to mention, that the treatment consists chiefly in the correction of uterine irritation, the improvement of the constitutional condition, and the local application of belladonna or other soothing remedies. In some of these varieties the sesquioxide of iron possesses considerable efficacy, but its use sometimes requires the preliminary application of leeches to subdue local congestion.

3. Rheumatic neuralgia is apt to occur in gouty or rheumatic subjects after exposure to wet; the pain is induced by slight exercise, and is dull, aching, or gnawing, rather than stabbing or plunging. In these instances there is reason to believe that the neurilemma is more or less affected. If the attack be acute, cupping or bleeding will be necessary, followed by the use of antimony, colchicum, and purgatives. Plaisters of opium or belladonna may be advantageously applied, and an occasional night dose of calomel combined with James's powder, guaiacum, nitrate of potash, and opium, followed by an aperient in the morning, will sometimes prove singularly efficacious.

If the complaint be decidedly intermittent, quinine will be found almost a specific. In the chronic form, especially if benefited by the application of warmth, the administration of turpentine will sometimes give relief; but the ammoniated tincture of guaiacum, in doses of from twenty drops to two drachms every four hours, is probably the most efficacious remedy. Stimulating applications containing mustard, pepper, or salt, the hot douche, sulphuretted baths, and especially those of St. Sauveur and Barèges, may be had recourse to with advantage. In this form of neuralgia, acupuncture is often surprisingly efficacious. These cases are remarkably influenced by the state of the mind, which must therefore receive a due share of attention.

Neuralgic complaints have occasionally occurred, apparently produced by syphilitic exostosis, and which yielded to mercury. Dr. Corkindale administered this mineral with success in a case in which this origin was suspected. The late Dr. Warren was indeed accustomed to treat most cases of neuralgia with blue pill combined with extract of belladonna; but though the mercurial plan has occasionally succeeded, yet as a general rule it may be stated, that except in instances depending on a syphilitic origin, the continued use of mercury is more likely to increase the nervous irritability than to cure the complaint.

Dr. Rowland mentions having derived great benefit from the application of nitrate of silver to the vesicles in cases of neuralgia depending on herpes. When the complaint is produced by the irritation of old cicatrices, he applies the same remedy to the cicatrix, and also insulates it from the surrounding skin by a circle of the caustic. It is worthy of notice, that when the insulation is incomplete, the pain, although checked in its usual course, shoots through the opening and attacks the neighbouring parts. (*On Neuralgia.*)

In neuralgia of the urethra, the occasional introduction of a bougie constitutes the most effectual treatment. In neuralgia depending on subcutaneous tubercle the local application of belladonna often gives considerable relief, but the only effectual remedy is excision. The application of caustic has been tried, but with unsatisfactory results; and the sore produced has proved difficult to heal.

PARALYSIS.

Explanation of the term. — Varieties and distinctions. — Symptoms. — Mode of accession. — Description of the various forms and varieties of paralysis. — General paralysis. — Hemiplegia. — Paraplegia. — Various forms of local paralysis. — Paralysis of particular muscles. — Strabismus. — Ptosia and lagophthalmia. — Aphonia. — Paralysis of the face. — Paralysis of a limb, or particular muscles of a limb. — Paralysis of sensibility. — Amaurosis. — Copiosis. — Anosmia. — Ageusia. — Anæsthesia. — Paralysis of motion. — Paralysis of the insane. — Paralysis from metallic poison. — Mercurial palsy. — Lead palsy. — Paralysis agitans. — Causes of paralysis. — Anatomical characters. — Nature. — Crossed effect from lesions above the medulla oblongata. — Direct effect from lesions below. — Diagnosis. — Seat of the lesion. — Nature of the lesion. — Prognosis. — Treatment.

By paralysis (from παράλυσις, *dissolutio resolutio*) is understood a diminution or loss of motion and sensibility in one or more parts of the body. By the older writers it was confounded with apoplexy, with which it is often complicated, but they are quite distinct and independent of each other.

Varieties and distinctions. It usually happens that both motion and sensibility are affected together; but the one may be lost or diminished, while the other is unimpaired. Hence the necessity of distinguishing paralysis of motion from paralysis of sensibility. The former is called *acinesia* (from ἀκίνησία), the latter *anæsthesia* (from ἀναίσθησία). All paralytic affections, then, may be divided into two classes:—the first including those in which both motion and sensibility are affected; the second, those in which the one or the other only is lost or diminished. We propose to denominate the former *perfect*, and the latter *imperfect* paralysis. Again, the paralysis may be *general* or *partial*, as it affects the whole body or only a portion of it. Partial paralysis is divided into *hemiplegia*, (from ἡμισός, *dimidius*, and πλήσσω, *percutio*), when it is limited to the lateral half of the body; and into *paraplegia* (from παρὰ, *aug.*, and πλήσσω), when it is confined to the inferior half of the body. The term *local paralysis* has been applied, when a smaller portion of the body, as a limb, a foot, a hand, or a finger, becomes affected. As regards intensity or degree, paralysis may be *complete* or *incomplete*. With respect to its cause, it is spoken of as being *idiopathic*, when arising from mental emotions, exposure to cold, &c.; or *symptomatic*, when occasioned by any other malady. The propriety of using the former term is very doubtful, as every form of paralysis is symptomatic; although in all cases the nature of the morbid lesion on which it depends is not known. When produced by lead, mercury, arsenic, and other poisons, the term *venenata* has been usually adopted. Paralysis may be *fixed* or *movable*, *continued* or *intermittent*. Some nosologists describe an *exanthematic*, *febrile*, *plethoric*, *serous*, *bilious* paralysis, &c.; but these terms are little used in the present day, being mere designations of causes. When treating of apoplexy, congestive and organic, cephalalgia, myelitis, &c. we have enumerated the symptoms which precede paralysis. We consider it unnecessary, therefore, to say any thing here of the premonitory signs.

Paralysis has been observed more frequently on the left than on the right side, which has been attributed to the greater weakness of the former, and the comparatively little exercise to which it is subjected. It is also more common in the lower than in the upper extremities. In whatever part of the body paralysis appears, it may be perfect or imperfect, complete or incomplete. Sometimes there is a greater loss of mobility than of sensibility, or the reverse takes place, and every gradation may occur from the most trifling loss of either

to the complete abolition of both. When different parts on the same or opposite sides of the body are affected, as the legs, arms, &c. the paralysis may be more complete or perfect in one place than in another. In hemiplegia, the arm or the leg may be most completely paralysed, and in paraplegia one leg more than the other. In local paralysis also, as of the leg or arm only, an individual may have perfect and complete paralysis in the fingers or hands, toes or feet, while in the forearm or leg the paralysis is incomplete or imperfect.

Paralysed parts present different appearances. They are generally pale, livid, and flaccid; sometimes œdematous. In certain cases they are covered with copious perspiration, which is occasionally of a viscous or greasy nature, and in others, while the perspiration is abundant on all other parts of the body, there is no perceptible moisture in those which are paralysed. The temperature is sometimes increased, as remarked by Dr. Abercrombie, or it may be diminished, as observed by Mr. Earle and others, a circumstance which the former writer has attributed to their losing the property which healthy parts possess of retaining a medium temperature, while they readily acquire that to which they may be exposed. There is often more or less rigidity of the muscles in paralysed limbs, and the joints are usually in a state of flexion. Sometimes they can be readily extended, but it is often necessary to overcome more or less resistance in doing this. In old persons, if the disease has existed some time, the joints often become flexed, and almost immovable. Though in a large proportion of cases, there is impaired motion and sensibility in paralysed parts, they are occasionally painful, the pain being of a tingling, pricking, dull, acute, or even lancing character. It may also shift from one paralysed part to another, and may be continued, remittent, or intermittent. The muscles in such cases often appear to be the seat of this pain, as it is not increased by slight contact, but by pressure.

A peculiar sensibility in paralysed parts is a subject which has lately attracted some attention. In a case of complete paralysis of the extremities, detailed by Dr. Elliot of Carlisle (*Lancet*, 1837-8, vol. ii. p. 77.), spasmodic actions were occasioned on irritating the parts. We have often seen in limbs which were paralysed, muscular motions excited by pricking or pinching the skin, and especially by tickling the sole of the foot, although the utmost voluntary efforts of the individual were unable to produce the slightest movement. But in such cases there has always been some slight feeling, and we have never observed these movements when the patient has been wholly unconscious of the application of stimuli to the affected part. We have no doubt, however, that spasmodic actions may be occasioned in paralysed limbs by the application of stimuli, independent of sensation, although their occurrence in the human subject must be considered one of great rarity.

It has been stated that the circulation in paralysed is more languid than in healthy limbs, and that the pulsations of the arteries are diminished. Whether this is universally the case may be doubted, but some observations to which we shall presently refer, show that it frequently happens. In a longer or shorter time, paralysed parts diminish in volume, become thin, and afterwards sensibly atrophied; which is another proof of diminished circulation. It sometimes happens that, while the tissues are really atrophied, a greater or less effusion into the cellular substance may give the part an appearance of enlargement. When one or both of the inferior extremities are affected with incomplete paralysis, so that with the assistance of a stick or crutch the patient is enabled to walk, progression is made in a peculiar manner. This is very well seen when one limb only is affected. In such cases the knee of the paralysed extremity is flexed, the heel elevated, while the toes, turned outwards, scrape the floor. There is great difficulty in lifting up the limb and placing it before the other; in doing this, the foot is thrown outwards, and the patient then sets it down with the knee perfectly straight. The difficulty of walking and the above symptoms are increased as the paralysis becomes more complete, and are often alone sufficient to distinguish the paralytic affection.

When chronic paralysis affects the muscular system, and more especially the lower extremities, interfering with the muscular motion, and consequently the proper exercise of the affected parts, the general health is gradually impaired. The skin becomes pale and flaccid, and the muscles soft. In general, the respiratory or digestive organs are little affected, unless the muscles more particularly connected with these functions are paralysed. Occasionally, however, the appetite is increased, which sometimes leads the patient into various excesses. The circulation also is usually undisturbed, though palpitations of the heart, and a frequent, feeble, or irregular pulse are now and then observed. The nutritive functions are imperfectly performed: hence, most persons labouring under paralysis become very thin. The intelligence is sometimes unaffected to the last, though frequently it is impaired; and the memory is more or less enfeebled. The speech is often thick and confused, and occasionally particular words or names cannot be remembered, or one word is substituted for another. Some paralytics become gradually idiotic, others have their natural character totally changed, and become timid and suspicious, or peevish, irritable, and irascible: mild and placid persons show signs of antipathy, or break out in paroxysms of anger; in other instances, individuals who were previously noted for courage and vigour of mind, shed tears from the most trifling causes, and often without any apparent motive. In the advanced stage of paralysis, but more especially when the mental powers have suffered, the countenance very frequently assumes an expression of stupidity.

The manner in which paralysis comes on is important, with respect to proper views of treatment. The principal points to be observed are, whether it occur suddenly or gradually, with or without premonitory symptoms, as a knowledge of these circumstances is necessary to enable the practitioner to form a correct diagnosis of the morbid lesion which is the primary cause of the disease. Paralysis may take place suddenly from cerebral or spinal apoplexy, in which case all the phenomena we have detailed in describing those diseases are observed. A local form of palsy may be suddenly induced by strong pressure on a limb or on a single nerve, by a tight ligature, a fracture, luxation, circumscribed effusions of blood, or various kinds of wounds, dividing the nerves, &c.

Paralysis of one or more parts of the body may occur in various ways. The patient may suddenly and unexpectedly become hemiplegic or paraplegic, or affected with some form of local paralysis at first, in a very trifling degree. There may be only weakness in the part, sometimes accompanied or succeeded by tingling, or a degree of numbness and impaired motion. The individual cannot perhaps stand or walk so firmly as before, or there is an awkwardness in moving one hand, or objects are less firmly grasped by it than by the other. On touching bodies he cannot feel distinctly by means of the hand affected, the sensation produced being often compared to that felt by examining substances with the hand covered with a leather glove. This obscure sensibility and difficulty of movement may remain stationary for some time, and then gradually or perhaps suddenly increase, until complete paralysis is manifested.

In some cases the numbness first appears in a small circumscribed part, as in one toe or finger, and gradually extends up the limbs, often involving in its progress other parts of the body; it may thus commence in the eyelid, spread over one or both sides of the face, and thus suddenly appear in the fingers, arms, toes, or legs. This is denominated by many writers *creeping palsy*. In this manner local or general paralysis, hemiplegia, or paraplegia, may be permanently produced according to the extent to which this creeping affection may proceed. Again, local paralysis has often been caused by the gradual increase of tumours, which press on particular nerves. Lastly, a few cases have occurred in which the upper parts of the arm have been paralysed, while the hand was unaffected. (Velpeau, *Arch. Gén. de Méd.*, 1835; Abercrombie, *on the Brain*, &c.)

1. *General paralysis*, properly so called, or total loss of sensibility and motion throughout the system, cannot take place without extinction of life. This

term therefore is only applied to paralysis of the four extremities, whether any other parts of the body are affected or not. General paralysis, like the other forms, may come on suddenly, or gradually. In the former case it is either the result of extensive extravasation of blood, or dislocation and fracture of the bones pressing on the cranial or cervical portions of the spinal cord. When it occurs gradually, it usually commences in the toes or fingers, and extends by degrees over the body. In middle-aged or old persons labouring under this form of the disease, the change in their natural disposition is often well-marked. The intelligence also in general becomes sooner or later impaired. We saw lately an old woman affected with general paralysis, and unable to utter a word or make the slightest sign, betray no indication of intelligence, except by excessive weeping when she was asked questions or even looked at. In this form of palsy loss of motion is usually more marked than that of sensibility, indeed it is very rare that in general paralysis the sense of feeling is entirely abolished. M. Defermon has given a case in which the intelligence was perfect, but the sensibility was wholly destroyed, except in a small patch on the right cheek, by tracing letters on which his friends were enabled to hold intercourse with him. The motion also of every part of the body was lost, with the exception of the muscular apparatus of the tongue, and of the organs of deglutition and respiration. (*Bulletin des Sciences Méd.*, vol. xiii. p. 6.) Another remarkable case is given by Mr. Davies Gilbert, of a girl who had lived to the age of seventeen years without general sensibility or voluntary motion. She was blind, deaf, and dumb, and betrayed no evidence of intelligence, except such as was manifested by a feeble cry when she wanted food, and a certain appearance of satisfaction while she was eating fruits and confectionary. On a post mortem examination of this case, the sensorium and dura mater lining the base of the cranium were deficient, the latter being replaced by a thin semitransparent membrane very lax and irregular. All the nerves were firm and healthy. The paralysis in this case must be ascribed to the pressure to which the nerves were subjected from the mass of the brain before they entered their separate foramina. (*Edin. Med. and Surg. Journ.*, Jan. 1828.)

2. *Hemiplegia*. This term is used to denote paralysis of one side of the body, or at least of one upper and lower extremity. When the arm of one side and the leg of the other is affected, the term *transverse* paralysis was applied by Sauvages. Hemiplegia is the most frequent form of palsy, and has been more commonly observed on the left than on the right side. It is often limited exactly to one half of the body, the median line forming the boundary between the sound and affected side. With a view of explaining this, Bordeu and Bichat supposed that the two halves of the human body were endowed with a separate existence, and possessed a life peculiar to each. The regular distribution of the spinal nerves however offers the true explanation. Hemiplegia may come on suddenly without any previous indisposition, or it may be preceded by several of the premonitory symptoms before alluded to, as cephalalgia, twitchings of the muscles, more or less fever, &c. In the former case it often precedes an apoplectic seizure, and on the other hand frequently follows that disease. Indeed, the morbid lesions in the brain, which produce apoplexy, most frequently occasion also hemiplegia, which becomes well-marked on the return of consciousness, and is more or less permanent. Sometimes hemiplegia comes on gradually; local paralysis is perhaps first manifested in the toes, foot, leg, fingers or hand, which slowly extends until the lateral half of the body is affected. More frequently, however, it appears suddenly and unexpectedly, so that very often individuals enjoying perfect health, and performing their usual avocations, are struck with complete paralysis of one side of the body. Occasionally there are spasms in the affected side, from which circumstance the disease has been denominated by Sauvages *spasmodic*, by other nosologists *hysterical* hemiplegia. It is generally only a modification of hysteria. In incomplete hemiplegia, the gait of the patient has

in a remarkable degree the peculiar characters before described, and the arm of the affected side is usually drawn to the trunk, the fingers, arm, and forearm being more or less rigid and in the state of flexion. *Intermittent hemiplegia* has been seen by Sauvages, Torti, Morgagni, Cullen, Larrey, Elliotson, and others. In general it is one of the anomalous forms of intermittent fever.

3. *Paraplegia* has been differently defined by different writers. Hippocrates confounded it with apoplexy. Aretæus understood by it partial paralysis; Boerhaave and Van Swieten, palsy of all parts of the body below the neck. Mr. Earle proposed, as a definition of paraplegia, "a paralytic affection of both sides of the body, whether that be partial or general, in opposition to hemiplegia, in which the affection is confined to one side." The majority of writers, however, have used this term to express paralysis of the inferior half of the body, or at least of the two lower extremities, in which sense we shall employ it.

Paraplegia may commence in the same manner as other forms of palsy, but most frequently begins with weakness and numbness of the inferior extremities, sense of weight and slight pain in the feet, extending a greater or less distance up the legs. The patient has a tendency to trip on slight occasions, and complains of fatigue after little exertion. As the disease advances, the necessity for support increases, until at length the power of walking is lost. Sooner or later paralysis of the bladder and rectum supervenes, occasioning incontinence of the fæces and urine, though sometimes at first there is retention of the latter, which after a time is discharged involuntarily. In paraplegia, the urine is particularly liable to deposit calculous formations, as pointed out by Dupuytren, who observed catheters left in the bladders of paraplegics become quickly covered with calculous incrustation. Sometimes the paraplegia is accompanied with cerebral symptoms, as cephalalgia, vertigo, dimness of sight, diminution or complete loss of the special senses, &c.; in other cases there are evidences of spinal irritation or disease, evinced by tenderness on pressing or percussing one or more of the vertebræ, pain on stooping, alteration of the form of the spine, projection of one or more of the vertebræ, &c. Not unfrequently there is much flatulency of the bowels. When this form of palsy is complete, there is perfect loss of sensibility and motion in the lower extremities, with paralysis of the bladder and rectum, so that the individual is obliged to remain in the horizontal posture; sloughs are particularly liable to form on the sacrum, and the exhausting discharge which follows generally accelerates the patient's death. Brachet of Lyons observed, that in these cases the uterus lost the power of contracting, and that it was always necessary to deliver paraplegic pregnant women with the forceps, a statement however denied by Andral, who has seen natural labour occur in a case of complete paraplegia. When paraplegia is not of very long standing, we find, as in hemiplegia, occasional spasms in the muscles of the lower limbs. Sometimes there is more or less permanent rigidity and contraction of the flexor muscles, so that the extremities are bent; occasionally the extensors have been at the same time similarly affected, and thus the limbs have been kept extended. Dr. Todd alludes to a case in which the extensor muscles were spasmodically contracted; there was no power of flexing the lower limbs, but if at the request of the patient they were placed in the state of flexion after the lapse of a short interval, they were, by short and successive twitchings of the extensor muscles, gradually brought back to the state of extension. (*Cyc. of Prac. Med.*, art. PARALYSIS.) In old chronic cases the muscles become atrophied, and the joints rigid.

4. *Local paralysis* implies loss of motion, and sensibility in some part of the body of small extent; and although frequently only the commencement of a more general affection, it is sometimes permanent: when thus limited it constitutes a modification of palsy.

Paralysis of particular muscles generally arises from division of, or pressure on, the nerves, which are distributed to them. Thus dislocation of the head

of the humerus pressing on the circumflex nerve produces palsy of the deltoid. The serratus magnus anticus muscle may be paralysed by injury of, or pressure on, the posterior thoracic nerve, as in cases recorded by Gendrin and by Velpeau. (*Anat. Chir.*, vol. i. p. 303.) Dr. Stokes has pointed out probable paralysis of the intercostal muscles and diaphragm, in connection with hydrothorax and diseased liver. (*Dub. Journ.*, No. xxv.) The sternomastoid muscle also may be affected, giving rise to symptoms like those of wry neck.

Strabismus is occasioned by palsy of one or more muscles of the eyeball. Palsy of the eyelids occasions two paralytic affections, *ptosis* and *lagophthalmia*; which are treated of at great length in works on ophthalmic surgery. In the former the eyelids are partially or completely closed, in the latter they are kept permanently open. The muscles concerned in the act of deglutition are occasionally paralysed, as in a case related by Mr. Hunter. (*Trans. of Soc. for the Improv. of Med. Knowl.*, vol. i.) But it is a very rare affection, except in hysteria, in which disease dysphagia is occasionally observed. (See HYSTERIA.) Dupuytren has given a case in which an hydatid pressing on the ninth nerve caused paralysis and atrophy of one side of the tongue. (*Leçons Orales.*)

Aphonia may be caused in three ways, by paralysis of the muscles of the larynx, of those of the face, or of the tongue. When the muscles of the face are paralysed, the individual can speak by supporting the cheeks with the hands. The power over the motion of the tongue may be lost for a time only, and afterwards suddenly return. Sometimes certain movements only are abolished or performed with difficulty, while in other respects the actions are natural. In incomplete paralysis of the tongue, when protruded from the mouth it is sometimes straight, sometimes drawn towards the sound, in other cases towards the paralysed, side. Various explanations of the latter occurrence have been given. Lallemand ascribes it to the action of the genio-glossus muscle of the unaffected side drawing the base of the tongue forwards, and turning the apex towards the opposite side. Others attribute it to the stylo-glossus bringing the base towards its own side, and turning the apex towards the opposite, by a swivel kind of movement. Cruveilhier considers, that, when the tongue is thrust forward, it inclines towards that side on which there is the most feeble resistance.

The above forms of partial paralysis rarely occur by themselves, and are more generally met with when one side of the body or face is affected.

Paralysis of the face. This form of paralysis is the effect of pressure or injury of the portio dura and fifth pair of nerves. In perfect paralysis of the face, the loss of motion is produced by lesions of the portio dura and motor branch of the fifth, and loss of sensibility by lesions of the sensitive portions of the latter nerve. The symptoms vary according as one or other of these is more immediately affected.

If the fifth nerve only is the seat of disease, in addition to more or less loss of sensibility of the parts to which its branches are distributed, the motions of the jaw on the affected side are impaired. Mastication is impeded in consequence of palsy of those muscles which subject the morsel to the action of the teeth; and from the impaired grinding motion of the jaws, the individual can only chew on the sound side, while in performing this act the action of the masseter and temporal muscles of the affected side is more or less imperfect. There is still command over the features however, and no distortion of the countenance, or loss of expression. The jaw is in some cases a little depressed, but this almost disappears when the patient smiles or laughs. This form of paralysis may exist alone, but is usually combined with hemiplegia. The loss of sensibility is referrible to a morbid condition of the ganglionic division of the fifth, and loss of mobility to the non-ganglionic portion. It is very rare that one is affected without the other. M. Serres has recorded a case where the gasserian ganglion only was diseased, occasioning loss of general sensibility on one side of the face, without impairment of mobility. (*Arch. Gén. de Méd.*, tom. v. p. 629.)

When the portio dura is affected, the general sensibility remains intact,

while the muscles of the face to which its branches are distributed are paralysed. The aspect of the face differs according as the muscles are in a state of repose or activity. In the former case, all expression is lost in the paralysed part; the two sides of the face are not symmetrical, and when viewed by themselves, apparently belong to different individuals. The features generally are dragged towards the sound side; the labial commissure of the paralysed part is drawn rather downwards, and is brought nearer the median line; the mouth is oblique, and its centre does not correspond to the axis of the body. The paralysed half of the face is a little more prominent than the sound one, which is wrinkled, contracted, and concealed behind the other, when viewed in profile. The paralysed side also appears broader than the sound one, while the eyelids are opened wide, and the eye appears more voluminous than its fellow. When, on the other hand, the individual speaks, laughs, cries, sneezes, or coughs, the deformity of the countenance is much increased, the mouth and features remaining perfectly motionless on the paralysed side, while on the other they appear thrown into inordinate action. The muscles moving the jaws however, which are supplied by the motor portion of the fifth, are still obedient to volition; mastication is readily performed, and the patient can hold solid bodies between the teeth. The cheek on the affected side is flaccid, it swells at the moment of expiration, and especially when the patient wishes to blow or pronounce a word with emphasis. The lips are paralysed, and the saliva and aliments sometimes escape from the mouth on the palsied side. The pronunciation of vowels, as the *o* for example, which requires the intervention of the lips, is imperfect. The labial consonants, as *b* and *p*, are very imperfectly articulated. Lastly, the patient has difficulty in spitting out his saliva, or directing it to any given point at a distance from his mouth. Occasionally the patient is enabled to articulate with tolerable freedom, by supporting the paralysed cheek with his hand. Lagophthalmia is frequently observed in this variety of palsy, exposing the eye to constant irritation, and often producing ophthalmia. When the disease is of long standing the affected muscles are often wasted, giving a peculiar expression to the countenance, which an experienced eye readily recognises.

It is rare that the lesions are confined to the fifth or seventh pair of nerves: in general, the symptoms characterising disease of the one and the other are conjoined, although both nerves are seldom equally affected. It usually happens that the affection appears first in the one and then in the other, and that when the muscles on which the nerves of the first ramify are completely paralysed, the muscles supplied by the second are partially affected. In these cases also the paralysis is often accompanied with neuralgia of a very distressing and acute description. We have lately seen a case of paralysis of the left side of the face, in which the eyebrows, chin, and all the parts furnished by the first and third branches of the fifth nerve, were completely paralysed and perfectly insensible, while the cheek, left ala of the nose, and parts supplied by the second branch, were extremely painful, and the slightest touch caused intense agony.

Paralysis of a limb, or of particular muscles of a limb, is not uncommon, arising from causes affecting the nerves by which it is supplied. Dr. Healy has described it appearing suddenly in the hand and forearm during sleep, which he attributes to the head resting on the arm, and compressing the nerves. (*Dub. Hosp. Rep.*) Dr. Darwall has seen paralysis of the deltoid muscles attached to the scapula and humerus follow the lifting of heavy weights. It often extends to the whole extremity, and apparently arises from the nerves being injured by the exertion and straining employed. Sometimes the extensors, in other instances the flexors only, are affected. Occasionally, as noticed by Sir C. Bell, there is only paralysis of the fingers, so that the power of writing is either lost, or the letters are written zigzag. In the same way, by injuries or diseases of the different nervous branches, the muscles, or sets of muscles they supply, in either of the extremities, may become paralysed. In general however, when palsy occurs in the hands or feet, it is the precursor of mere general paralysis.

5. *Paralysis of sensibility*, both special and general, may occur, the muscular motion being perfect or only impaired.

Amaurosis. The disease is termed amaurosis (from *ἀμαυρός*, obscure), when the retina loses its sensibility to the rays of light. We must refer to AMAUROSIS and to works on ophthalmic surgery for a description of this affection, as our limits preclude us from treating so important a subject in this place.

Cophosis (from *χῶφος*, deaf), is used to express deafness, or insensibility to the impressions of sounds. It may be caused by compression or structural disease of the auditory nerve; obliteration or obstruction of the canals and passages of the auditory apparatus, &c.

Anosmia (from *ἀ*, privative, and *ὀσμή*, smell), or insensibility to odours, is sometimes congenital. Cases of this kind have been met with by Good, Todd, Pressat (*Thèse*, 1837), and others. When it is the result of disease, it is occasioned by pressure on, or organic alterations of, the brain, involving the olfactory nerves and ethmoid bone. More commonly it follows alterations in the Schneiderian membrane, of an inflammatory or congestive nature, as in coryza.

Ageusia (from *ἀ*, privative, and *γευστις*, taste), or loss of taste, is occasioned by insensibility of the nerve or nerves, which have been termed gustatory; but what those nervous branches so endowed really are, is a point still disputed by physiologists. Chewing tobacco or other narcotics, smoking, a thick fur on the tongue, as in the various forms of acute as well as chronic diseases, may more or less impede or destroy the taste.

Anæsthesia (from *ἀ*, privative, and *αἴσθησις*, sensibility). In perfect paralysis there is loss of general sensibility, or that of touch, as well as loss of motion. But when the sensibility is lost or diminished, while motion remains perfect or nearly so, the affection is denominated anæsthesia. This may be complete or incomplete, general or partial. Good, Yellowly, Earle, Bell, Andral, Ollivier, and others, have recorded cases of complete anæsthesia. In these instances the part affected is insensible to the most powerful stimuli, or to the most severe injuries. Phlegmous abscesses, the formation of blisters from the application of heat, wounds of different kinds, fractures, &c. have occurred without causing the slightest pain. Mr. Liston removed the metatarsal bone of the little toe from a gentleman who did not experience the slightest pain during the operation; sensibility was nearly if not altogether lost, while that of motion was so entire as to enable him to use his hands in carving his food, in writing, holding the reins on horseback, &c. (*Med. and Surg. Journ.*, vol. xxxi. p. 292.) A similar case is related by Mr. Reid. (*Idem*, April, 1829.) Such cases, however, are very rare. A singular case is recorded (*Med. Chir. Trans.*, vol. ii. p. 217.), in which the left side of the head was insensible, while the sensibility of the right was perfect; in the left side of the body and in the left extremities, also, the sensibility was diminished. The right side was quite insensible to touch, but the impressions of heat and cold produced sensations directly opposite to those experienced in health. Instances are recorded in which, although the anæsthesia was general, a small spot on the surface retained its sensibility. In a case related by Ollivier, this spot was situated on the hip, and in another, by Andral, on the cheek. In general, however, the disorder is partial. Andral has observed the loss of sensibility confined to five or six round spots on the surface, of the size of a crown-piece, the surrounding skin being perfectly natural. (*Clin. Med.*) It may also be limited to different parts of the face, to a limb, one side of the body, &c. Muscular motions, under such circumstances, can apparently only be performed by the individual fixing all the attention he can command on the performance of the required muscular effort. In Dr. Yellowly's case the patient could hold objects so long as her eyes were directed to them; but the moment her attention was otherwise directed, they fell from her grasp. When the face is so affected with anæsthesia, that a portion of the lips only is involved, the individual on drinking from any vessel invariably feels as if the margin was broken. It has been observed, that the mucous membranes continuous with the common integuments affected, not

unfrequently lose more or less of the general or special sensibility, with which they are in their healthy state endowed. Hence the conjunctiva becomes insensible and inflamed, the inflammation in some cases being so severe as to destroy vision, from the application of irritating bodies of which the patient is unconscious. The Schneiderian membrane is sometimes similarly affected, and the sense of smell destroyed. Occasionally there is deafness, and in many cases loss of taste results from the want of general sensibility in the mouth. In the same manner when anæsthesia attacks the abdomen and lower extremities, the introduction of a catheter into the urethra causes no pain, and the urine flows from the bladder, and fæces from the rectum, without the consciousness of the individual.

Anæsthesia may come on suddenly or gradually. In the latter case there is sometimes a sensation, as if fine sand were interposed between the skin and the object touched, or as if the former were covered with woollen or other kinds of stuff, or it sometimes commences with pricking or formication. In either case the insensibility may remain stationary for an uncertain period, and then disappear, or gradually increase, until complete anæsthesia is produced.

The duration of this affection is variable. It may continue for a short period only, or for several years: in the former case it may return unexpectedly. M. Guest has given an account of the disease as it appeared epidemically in Paris, in the summer and autumn of 1828. (*Arch. Gén. de Méd.*, October, 1828.)

6. *Paralysis of motion* generally accompanies loss of sensibility, but may occur without the sensibility being at all impaired. We are not aware of any recorded case, however, in which the voluntary motion was completely abolished, while the sensibility in the motionless part was perfect. Dr. Ley has described the case of a young woman, who after delivery became affected with loss of motion on one side of the body, and loss of sensibility on the other. She would hold the child to one breast as long as she looked at it, but on the attention being abstracted, there was danger of her dropping the infant. On this side she could not feel the application of the child's mouth to the nipple, though she could see it sucking; on the other side feeling was intense, but she was unable to hold the child to the breast. A somewhat similar case is given by Dr. Bright. (*Case 271.*) Not unfrequently paralysis of motion alone is a sequel of perfect paralysis, the sensibility gradually returns, having the power of motion more or less affected.

The accession of paralysis of motion may be sudden or gradual. Sometimes a certain degree of rigidity is present in the paralysed part, and the limbs are somewhat flexed; in other cases they are perfectly flaccid and powerless. Loss of motion is occasionally preceded by spasms and pain, more or less violent and severe; and not unfrequently the sensibility is morbidly increased. Mr. Travers relates the case of a man who, after an injury of the back by a fall, felt the most agonising pain in the lower extremities from the slightest touch: to use his own words, "when any one even walks by his bedside, it is just as if a number of razors were cutting him down to the bone." (*A Further Inquiry into Constitutional Irritation*, p. 358, 359.) Dr. Abercrombie also relates a case in which, conjoined with loss of motion in the arm, the sensibility was so increased, that the least breath of cold air brought on convulsions. The sensibility of the part also may be more or less perverted, giving rise to sensations of pricking, tingling, or formication; hot bodies may be mistaken for cold, or cold bodies for hot.

7. A peculiar form of paralysis occurs in the alienated, which has been described with great care by Calmeil (*De la Paralyse considérée chez les Aliénés*), and also by Dr. Prichard. (*Treatise on Insanity*.) It may precede insanity, a circumstance however which is very rare, or take place at the same time which is not common, or, as is generally the case, it may appear at a longer or shorter interval after alienation has been established. It is a kind of creeping palsy, but presents the peculiarity of appearing first in the tongue. The whole course of the affection has been divided into three stages. In the first the move-

ments of the tongue are embarrassed, and this increases until the pronunciation of words, which is at first difficult and performed with effort, becomes impossible. In the second stage the paralysis extends to the extremities, most commonly the inferior, commencing by a degree of weakness, dragging of one limb, &c. and gradually increases in intensity, and at the same time extends to the superior extremities and other parts of the body. In some the paralysis is permanent, but in others motion has been known to return under the influence of passion, or strong mental emotions. When all power of locomotion has ceased, the third stage is established, and the disease then gradually affects the functions of organic life. The bladder and sphincter ani are paralysed, and if the affection is not complicated with other organic lesion, which may terminate life, the individual dies from general exhaustion, palsy of the muscles of deglutition, or those of respiration, producing asphyxia. The sensibility is very slightly affected in this form of paralysis.

The paralysis of the alienated now described is very common in Paris, and has been observed more so at Charenton, where patients in an elevated class of society are treated, than at the Bicêtre, which is an institution for the poor. It is most frequent between the ages of thirty-two and fifty, being rare before and after that period. It is seldom that an insane person with paralysis lives more than four or five years; but Calmeil says, that "such individuals have the chance of existing for thirteen years."

8. Paralysis from *metallic poisons* presents peculiarities that require notice.

Mercurial palsy. This form of paralysis is liable to attack artificers in quicksilver, gilders of toys, buttons, glass-platers, barometer-makers, &c. It generally comes on gradually, although in some cases its appearance is sudden. The arms are the parts generally first affected, and the individual has less control over them than usual. Sometimes he experiences a sense of weakness; occasionally slight convulsive twitchings, followed by a continued state of tremor, which gradually extends to the legs, and, in some cases, to the whole body. All muscular movement is now so impaired, that any kind of combined motion is imperfectly performed. Thus articulation, mastication, and locomotion, are performed with difficulty, and the use of the hands is almost entirely lost. Occasionally the muscular movements are so violent as to resemble convulsions. In some cases the patient suffers from abdominal pains; the whole body has a brown tint, the skin is dry; there is restlessness and delirium, with more or less derangement of the general health. There is no disorder of the respiration, impaired digestion, or colic; and, except in chronic cases, no wasting. Mental emotions and efforts to control the muscles almost invariably increase the inability and tremors.

Lead palsy. Plumbers, glaziers, painters in oil and water-colours, type-founders, colour-grinders, and workers in the different preparations of this metal necessary for manufactures and the arts, are liable to be affected with palsy. It usually accompanies or follows colica pictonum, but may exist independently of that affection. It has been rarely observed in the inferior extremities, the hands being generally affected, though the palsy sometimes extends to the forearm. Lead palsy commences by a feeling of weakness in the fingers, which soon extends to the wrists, beyond which it seldom passes, although there is often pain in the shoulders, arms, and forearms, which resemble rheumatism. The wrist, according to Dr. Pemberton, is remarkably flaccid and loose. The patient cannot grasp any thing with firmness, and, as the disease advances, he cannot use the hands. The fingers are bent, and cannot be extended voluntarily; there is no rigidity, however, as they can readily be straightened by force, and assume their natural position when the arms hang down. In general there is little diminution of sensibility in the skin. Christison and Bright have noticed the occasional wasting of the paralysed parts.

Paralysis from arsenic, given in poisonous doses, has been observed by De Haen, Murray, Falconer, Christison, and others. It generally occurs in the ex-

tremities, and may be complete or incomplete. Dr. Christison observes, "on the whole, local palsy appears to be the most frequent of the secondary effects of arsenic" (*Treatise on Poisons*, 3d edit. p. 184.)

9. *Paralysis agitans*. A peculiar form of palsy, termed *paralysis agitans*, has been minutely described by Mr. Parkinson. Its approach is very gradual, and characterised by weakness and trembling, which usually commences in the hands and arms, but occasionally in the head, and by slow degrees extends over the whole body. At length the trembling becomes incessant, and when the patient attempts to advance, "he is thrown on the toes and fore part of the feet, and impelled unwillingly to adopt a running pace, being in danger of falling on his face at every step." When the disease is advanced, the shaking continues during sleep; the patient cannot carry food to the mouth; there is constipation; mastication and deglutition are performed with difficulty; the agitation at length becomes so violent as to prevent sleep; the body is bent forward, and the chin bent upon the sternum; articulation is impaired or entirely lost; the urine and fæces pass involuntarily; and "coma, with slight delirium, closes the scene." (*Parkinson on the Shaking Palsy*.) This affection, which is rare, is distinguished from mercurial palsy, delirium tremens, chorea, and nervous tremor, by the agitation continuing when the limb is supported, and the peculiar gait of the patient,—a symptom which has been thought by some, pathognomonic.

Causes. Paralysis is more common in men than in women, and less frequent in youth than in infancy and adult age. It is one of the most frequent disorders of old persons. It is much oftener observed in persons of a feeble constitution, and in those who lead a sedentary life; while those of the sanguinous and nervous temperaments are said to be more predisposed to the affection than others. Particular trades favour the production of certain forms of paralysis; thus, as we have noticed, the disease occasionally occurs in house-painters, plumbers, workers in the different preparations of lead, glaziers of earthenware, miners, ornamental and water-colour painters, looking-glass and barometer-makers, &c. From the appendix attached to Dr. Cook's work, palsy appears to be rare among soldiers. Mental labour and luxurious habits of living also predispose to paralysis, much more than a sober and active life, or one requiring much exercise in the open air.

The *exciting* causes may be divided into, 1. Those which affect the brain or spinal cord; and, 2. Those which influence the nerves in their course, or at their extremities.

1. The causes which more particularly influence the brain and spinal cord are those which produce pressure on, or destruction of, the nervous matter. Hence blows, falls, fractures, or other injuries affecting the skull and vertebral column, occasioning either concussion or depression of bone; osseous, fibrous, encephaloid, hydatid, tuberculous, or other tumours pressing on the nervous mass, or disorganising its substance; alterations of the bones and ligaments of the spine by caries, scrofula, or rachitis; atrophy, or agenesis, of the nervous centres; inflammation of the brain, and its consequences, as suppuration, softening, induration, &c. and indeed every kind of lesion to which the brain and spinal cord are liable, are exciting causes of paralysis. Any circumstance producing congestion, whether arterial or venous, may induce paralysis,—as the various mental motions, joy, anger, grief, terror, anxiety, &c. exposure to cold or heat, sudden changes in the temperature of the weather, intemperance, fatiguing occupations and strained positions, constipation and affections of the bowels, metastasis of gout or rheumatism, diseases of the heart, sudden disappearance of the eruptive fevers, suppression of the lochia or menstrual discharge, cicatrisation of old ulcers, sudden check to the perspiration or accustomed discharges, as the hæmorrhoidal, epistaxis, &c. excessive venereal indulgences, &c. Paralysis has also been known to follow tying the carotid artery.

2. The causes which act especially on the nerves are, inflammation and thick-

ening of the different membranes at the point where they leave the cranium, or vertebral canal; disease of their investing neurilemma, or of the nerves themselves; various tumours situated in their course, in which they may be involved, as aneurisms, osseous, fibrous, encysted, and other kinds of morbid growths, abscesses, effusions of blood, contusions, &c.; fractures or spiculæ of bone, or luxations producing pressure on one or more of the nerves; various kinds of wounds, or incisions by which they are divided; ligatures thrown round them in tying an artery, &c. Paralysis may result from exposure of a part of the surface to a piercing wind, or to cold, from the influence of this agent on the extremities of the nerves of the part.

Some causes act in an obscure manner; thus the influence of metallic poisons, as lead, mercury, and arsenic, in producing palsy, has not been explained. Paralysis has followed the inhalation of certain fumes. Stoll says, he has seen hemiplegia produced by the fumes of charcoal (*Rat. Med.*, p. 7.), and Bosquillon by the vapours of quicklime and mephitic air.

Anatomical characters. Every kind of alteration to which the nervous system is liable, has at different times been found on the dissection of persons who have died paralytic. On the other hand, many cases, both of local and general paralysis, have been examined after death, without any morbid lesion whatever having been discovered. To enter into the morbid anatomy of paralysis, however, is only to repeat what has been stated, when describing the diseases of which it is symptomatic. Thus the membranes and substance of the brain have been found more or less vascular, presenting traces of acute or chronic inflammation, or extravasations of blood, effusion of serum, softening, induration, abscesses, ulcerations, different kinds of tumours, apoplectic cysts, &c. (See INFLAMMATION OF THE BRAIN, APOPLEXY, &c.) It has been observed also to follow an imperfect development, or "agenesia," of the nervous centres, and wasting or atrophy of the same parts. We have often seen the corpora striata atrophied in old persons, in whom no other morbid alterations could be discovered, and are inclined to think that this is a more common lesion in old paralytics than is generally supposed. In a case of hemiplegia, mentioned by Mr. O'Halloran, a considerable quantity of the right hemisphere had sloughed out producing a "frightful cavern." (*Injuries of the Head.*) The membranes and substance of the spinal cord have been found to present all the appearances described under EPILEPSY, SPINAL MENINGITIS, MYELITIS, HYDRORACHIS, and SPINAL APOPLEXY. Caries of the vertebræ, as described by Pott, is sometimes found, and more or less displacement of the bones, from relaxation of the ligaments.

The nerves have been discovered more or less injected, and of a deep red or violet colour. They have been found occasionally enlarged by Pinel, Rostan, and Cazauvielh, but are more generally atrophied. They have also been disorganised by suppuration, softening, and complication with various morbid growths. Sometimes the nervous tissue has been indurated, and in a few cases has totally disappeared, leaving the sheath filled with fluid. The sheath may be thickened, causing more or less pressure on the nerve it encloses. A knowledge of the alterations occasionally discovered in the nerves, is only to be obtained by studying individually the numerous cases recorded by different authors, to whose works we must refer, especially to those of Bell, Abercrombie, Shaw, and others.

Changes of structure in other parts of the body have been found, but such alterations are for the most part accidental. Inflammation and thickening of the membranes of the brain and spinal cord, which are not unfrequent, are capable of explaining numerous cases of paralysis. Changes in the blood-vessels also have been thought capable of producing local paralysis, as in cases related by Abercrombie, Rostan, Storey, Graves, Stokes, and others. In these there was more or less disease of the vessels leading to the part, ossification of their coats and obstruction of their calibre from coagula of blood. Andral mentions the case of a child who was subject to momentary paralysis of the

voluntary muscles, in whom the superior longitudinal sinus was transformed into a hard cord, and the veins entering into it filled with coagulated blood. The muscles of paralysed limbs have sometimes been found degenerated into fat, especially in scorbutic individuals.

Nature. If some parts of the nervous system be the origin of nervous power, while others serve to conduct it, paralysis may be induced by any circumstances which diminish or prevent its evolution or transmission. Disease in the grey matter of the spinal cord may destroy the first, and injury of the medullary matter, or nerves, the second property; and the extent of the paralysis will be greater or less, according as the morbid lesion involves the origin of a greater or less number of nerves, or, what amounts to the same thing, cuts off their intercourse with the brain. Hence congestion, inflammation and its results, or the different kinds of morbid growths, may occasion paralysis by pressing upon the nervous mass, so as to prevent the exercise of its proper functions; or the same result may be produced by degeneration and destruction of the nervous tissue, cutting off its communication with the brain, the source of volition. Under the head of APOPLEXY we have explained how pressure or disorganisation, when they occur in the brain and cranial portion of the spinal cord, may cause paralysis; and, when speaking of spinal irritation, we have alluded to the influence of congestion on the vertebral portion, in which also morbid growths, and other changes of structure, will necessarily interfere with its functions. In order, however, to understand the pathology of paralysis, it will be necessary to give an outline of the different laws by which the cranial and vertebral portions of the cord appear to be governed.

It has long been a matter of observation, that disease on one side of the brain causes paralysis on the opposite side of the body—an effect which modern pathologists attribute to the decussation of fibres in the *medulla oblongata*. For a long time, however, this decussation was supposed to be confined to the anterior columns only; but although in this way the crossed paralysis of motion might be explained, it did not account for paralysis of sensibility following the same law: but Sir C. Bell has lately shown that the middle columns decussate as well as the anterior, which fully accounts for the crossed action of both. (*On the Nervous System*, 3d edit. p. 211. et seq.) It has been moreover objected, 1. that lesions of the cerebellum also produce a crossed effect, although this portion of the nervous system is situated above the point of decussation; and, 2. that paralysis of the face follows the same law, and arises from morbid changes on the opposite side of the brain, although the nerves distributed to it also arise above the decussation. In reply to the first objection it may be remarked, that the dissections of Mr. Solly have demonstrated numerous fibres running between the spinal cord, below the corpus olivare and the cerebellum, which he has no doubt actually decussate with their fellows of the opposite side, forming in fact part of the apparatus of decussation, though he has not yet positively ascertained that fact. (*On the Human Brain*, p. 155.) This discovery at least establishes a direct communication between the cerebellum and spinal cord in the immediate neighbourhood of the decussation, and is an answer to the first objection. With reference to the second, Sir C. Bell has also shown that the fifth pair of nerves arise below the decussation; and Mr. Solly has traced one of the origins of the *portio dura* from the fibres he has described, which run between the spinal cord and cerebellum: thus the sensitive and motor branches of the face ought to follow the same law as the other spinal nerves, which is consonant with what actually takes place. These dissections are in accordance with numerous pathological observations on record, and appear to us capable of explaining the obscurity with which this subject has been hitherto enveloped.

Cases have been recorded, however, in which paralysis has occurred on the same side as the lesions of the brain. Mr. Hilton, in a paper read before the *Royal Society*, 1837-8, has lately shown a disposition of fibres in the decussation, which he thinks explains this exception to the general law. But there are strong reasons for doubting, whether disease in the brain ever causes a direct

influence. Of the many thousand cases of cerebral hemorrhage, softening, tumours, &c. which have occurred, we are only acquainted with twenty-one, in which paralysis is said to have resulted from disease in the same side of the brain; and on analysis, of these more than half are imperfect and doubtful, and should consequently be rejected. As instances, therefore, of this occurrence are so few, may we not consider that the paralysis even in them was produced in the usual manner, and that the morbid lesion had no reference to the complaint? Numerous instances have occurred, of abscesses, softening, and other morbid changes having been found after death, but in which there was no paralysis during life; and a still greater number are on record, in which there was well-marked paralysis during life, but no appreciable change in the structures after death. It is by no means improbable therefore, as paralysis may be induced without leaving any traces, that in these few cases it was caused by unknown changes in the opposite hemisphere of the brain; and, as is sometimes the case, that the lesion found in the hemisphere of the paralysed side had produced no effect. Such, we think, is the most probable explanation of these exceptional cases, although the question does not admit of a positive solution.

In the vertebral portion of the spinal cord, lesions produce not a crossed, but a direct, influence; and it may be stated as a general rule, that, whenever structural disorganisation, or morbid conditions, interrupt its functions, all the parts furnished by nerves arising beneath the lesion are affected. Hence the paralysis will be more general, the nearer the lesion of the cord is to the brain. But it sometimes happens, that in the former, as in the latter portion of the nervous system, disease gradually proceeds to a considerable extent, causing more or less disorganisation, while such fibres as may remain unaffected appear sufficient to carry on the necessary functions. Some cases have been recorded, however, in which the individuals have had voluntary movements of the lower extremities up to the moment of their death, and yet, on examination, the spinal cord has been found entirely destroyed. Every one accustomed to pathological examinations, must receive with distrust accounts of such observations, knowing how soon this portion of the nervous system may in certain cases become softened after death, and the injuries it is likely to receive in opening the vertebral canal, particularly in France, where the hammer is used to a most unwarrantable extent. A strict analysis of these cases will show, that there is no absolute proof that the cord was entirely destroyed during life.

In the celebrated case of Desault (*Journ. de Chir. de Desault*, tom. iv. p. 437.), the appearance of the parts are not described: it is merely stated, "the spinal marrow was totally divided;" and the movements which took place are thus narrated:—"He was in a continual agitation, and moved the pelvis and inferior extremities even to the last." In all this there is nothing decided. May not the movements have been excito-motory? Was the altered structure well-observed? The case of M. Rullier (*Journ. de Physiol.*, 1823) has been also frequently alluded to in connection with this question. It was that of a gentleman who had complete and perfect paralysis of the arms, without loss of sensibility and motion in the inferior extremities: he remained in this state six years, and died of pectoral complaints. Dr. Abercrombie alluding to the case states, that a portion of the cord, six inches in length, occupying two thirds of the cervical portion and part of the dorsal, was entirely diffuent; so that, before the membranes were opened, it moved upwards and downwards like a fluid. The posterior roots of the nerves of this portion preserved their nervous matter to their junction to the membranes of the cord; but in the anterior roots it was destroyed, and they were reduced to an empty neurilemma. (*Abercrombie*, p. 350. 3d. edit.) This writer mentions that the anterior columns were completely destroyed, and others in alluding to the case have thought a portion of the cord was entirely disorganised. The case itself is headed, *Disappearance (Disparition) of the Nervous Substance of the Spinal Marrow in the Superior Third of the Dorsal Portion* (*Ollivier*, 3d. edit. vol. ii. p. 368.), and yet,

in the details of the dissection it is stated, "On voyait à peine, vers la partie antérieure de cette portion altérée, les cordons médullaires en rapport avec les racines correspondantes des nerfs spinaux;" and again, "Cette altération était beaucoup moins sensible lorsqu'on regardait la moelle par sa face antérieure," &c. From this it would appear that certain continuous fibres still existed in the anterior columns, although they were seen with difficulty, but that there could be no doubt many existed in the posterior. The persistence of voluntary motion and sensibility in the inferior extremities under such circumstances, when the disease too was chronic, is in no way surprising.

Instances have also been recorded, in which balls have traversed the vertebral column; or swords have been thrust into the neck, which are said to have entirely cut across the spinal cord; or, as asserted by Velpeau, that the vertebrae have been found in a state of caries, without being followed by paralysis. We cannot here enter into the analysis of these cases, but those who choose to do so will readily come to the conclusion, that no positive proof exists that the cord was wholly destroyed during life. On the other hand, without throwing any doubts on the accuracy of the observations which have been made, may we not consider that the complete destruction which has been described, is in some degree a post mortem appearance caused by partial softening of the cord, mixing after death, perhaps, with the serous fluid always present? Is it not probable that the necessary violence in opening the vertebral canal may have broken across the fibres, which during life were entire? Again, may not the movements described in many cases have been excito-motory? At all events we consider that, in the present state of science, such views are much more rational than to suppose that the influence of volition can leap over four or five inches of disorganised spinal cord in order to reach the inferior extremities, or that impressions made on the latter can be communicated to the brain by other channels than the nervous system.

Diagnosis. Paralysis cannot readily be confounded with any other disease. It may, however, be complicated with insanity, or with the febrile, scrofulous, scorbutic, rheumatic, and other diseased states of the system.

The diagnosis of the lesion causing the paralysis is often obscure, and in many cases impossible. The most experienced physicians have occasionally committed the greatest errors, in attributing before death the affection to lesion of some particular part of the brain or spinal cord. In the case of an old woman who had hemiplegia of the right side, after momentary loss of consciousness, and who was found in the street unable to rise, we heard one of the most distinguished and experienced physicians for the treatment of cerebral disorders in Paris, publicly diagnose, "softening or extravasation of blood in the neighbourhood of the left ventricle, or hæmorrhage into the arachnoid cavity on the left side." On opening the cranium after death, neither of the three morbid conditions he had predicted was found, but a number of circumscribed, shallow softenings confined to the grey matter, distributed over the whole periphery of the brain, varying in size from a pea to a sixpence. This undoubtedly is a rare case, but illustrates the difficulties which attend the diagnosis, and we are of opinion that there is no physician who has had much experience in paralytic cases, that has not met with similar instances. At the same time, by a careful observation of the symptoms, with a knowledge of the history of the case, we are enabled in most instances to indicate with tolerable certainty the morbid lesion that exists.

The symptoms which more particularly indicate the situation of the morbid lesions are fully detailed in the articles, INFLAMMATION OF THE BRAIN, APOPLEXY, MYELITIS, SPINAL IRRITATION, &c. It must be remembered, however, that the cranial portion of the cord may not only be affected directly by destruction or effusion of blood, but indirectly by congestion, hæmorrhage, or other morbid alterations occurring in the substance of the hemispheres. Hence general paralysis may depend upon some cerebral lesion producing pressure upon the cranial portion of the cord, in the same manner as when that or the

cervical portion of the spinal marrow is directly affected. The two former may be distinguished by the presence of cerebral symptoms, such as headach and vertigo, derangement of the special senses, &c.; and the latter by the absence of these symptoms, pain in the neck, spinal tenderness, &c.

Hemiplegia almost always depends, as has been already remarked, on some lesion in the opposite hemisphere of the brain to the side affected; sometimes, however, it is produced by alterations of one side of the spinal cord. The former may be diagnosticated by the cerebral symptoms above alluded to, especially those mentioned under the fourth form of apoplexy, and the latter by those characterising spinal disease.

Paraplegia in general depends upon affections of the spinal cord, but as shown by Dr. Baillie and others, may arise from changes within the cranium. These latter may be known by vertigo, cephalalgia, diminution or loss in the special senses, and such symptoms as we have described under the heads of congestive and organic cephalalgia. Mr. Earle has pointed out the means of distinguishing paraplegia depending on caries of the vertebræ, from that caused by debility in the muscles of the back, inducing slight curvature. In the former the curve is angular; in the latter round, in the shape of a half-hoop. "If a person with such an incurvated state of the spine be placed on a horizontal plane, the back will immediately and spontaneously be restored to its proper form, without causing any pain or distressing symptoms, which would certainly be produced by any attempt at any extension of a diseased spine." (*Med. Chir. Trans.*, vol. xiii. p. 52.) This is important, as curvature with paralysis is not unfrequently seen in weak children, and has often been mistaken for diseased spine.

In local paralysis depending upon lesion of the nerves, those symptoms which characterise cerebral or spinal disease are absent: there will seldom be difficulty in detecting the part injured, if tumours, wounds, fractures, &c. exist. The previous occupation of the patient will indicate the paralysis arising from metallic poisons.

In order to distinguish partial paralysis of the face, arising from affections of the portio dura, or branches of the fifth pair, we refer to what has already been said concerning these forms of local palsy. When the ganglionic portion of the latter nerve is the seat of disease, disorganisation of the eye has been observed to take place, as in cases recorded by Alison, Stanley, and Serres. Care also must be taken not to attribute paralysis of the face depending upon disease in the portio dura, to changes occurring within the cranium, although cephalalgia, and a greater or less number of cerebral symptoms, may be complicated with it.

Another important point in the diagnosis is to determine the nature of the morbid lesion. In the present state of pathological knowledge, we have no diagnostic symptoms which indicate an invariable connection between the paralysis and morbid lesion on which it depends. In many cases, however, extravasation of blood is to be distinguished by the suddenness and intensity of the paralysis. If there be hemiplegia with loss of consciousness, we may predict hæmorrhage within the cranium in the hemisphere opposite to the affected side. Sudden pain in the back, and loss of motion in the parts below it, indicate extravasation of blood into the spinal canal. (See APOPLEXY and SPINAL APOPLEXY.) When paralysis arises from softening, according to Lallemand, there is more or less contraction. This is by no means invariably the case, many instances having been recorded, where no such symptom was manifested; and on the other hand, from the observation of many cases at the Salpêtrière in Paris, we are inclined to think it is equally common in cerebral hæmorrhage. The paralysis from softening occurs generally less quickly than that resulting from hæmorrhage; in some cases, however, it is equally sudden, and then it is impossible to draw any distinction between the two lesions. Paralysis from tumours is generally known by its slow progress and circumscribed nature.

The diagnosis of tubercles in the brain and spinal cord has been made in a

few cases at the Hôp. des Enfants Malades, in children of a scrofulous diathesis, in whom they are most common between the age of two and eight years (see Dr. Hennis Green, on *Cerebral Tubercle in Children*; *Lancet*, vol. i. 1838-9, p. 755.), and are very rarely met with after the age of twelve.

Cancer in the nervous centres has also been diagnosed, when individuals have suffered under the disease in other parts of the system. Contrary to what has been observed respecting tubercle, cancer is rare before the age of twenty, and most common between that of thirty and sixty.

We have merely alluded to this subject because the nature of the morbid lesion is not made the subject of diagnosis to such an extent as its importance deserves. For the symptoms of paralysis arising from other lesions, we must refer to the articles, **INFLAMMATION OF THE BRAIN, HYDROCEPHALUS, SPINAL IRRITATION, HYDRORACHIS, &c. &c.**

Prognosis. The danger of paralysis is in proportion as it is more or less general and complete. The difficulty of cure increases as the malady becomes more chronic. The prognosis in general must be governed by the diagnosis the practitioner is enabled to make of the seat and nature of the morbid lesion. If this be situated in the brain, or near the origin of the eighth pair of nerves, the prognosis will be very unfavourable. The same may be said if active inflammation exist in the spinal cord, causing paraplegia and involuntary discharges of urine and fæces. On the other hand, local paralysis, independent of disease in the nervous centres, although it may occasion great suffering and inconvenience, is rarely of immediate danger, and in such cases death generally takes place from the secondary effects on the constitution. Very severe cases of paralysis, however, have recovered, and the individuals have lived a long time without illness, and ultimately died of other disorders. Professor Ferguson of Edinburgh had hemiplegia at the age of fifty years, and by antiphlogistic treatment got well in a few months. He remained ever after free from the disease, and died at the age of ninety-three. (*Edin. Med. Chir. Trans.*, vol. vii. p. 230.) Such cases, however, are rare. Dr. Cooke says, "I do not recollect more than one or two cases of a complete restoration, both of sensation and motion, in the whole side of a person who had been affected with a perfect hemiplegia;" and this agrees with the general experience of physicians.

The prognosis of paraplegia will entirely depend on the nature and situation of the morbid lesion which causes it, and the extent to which the affected parts have been involved. If it comes on gradually and is chronic, it may exist for years before death, an event which may be ultimately caused by other diseases, or by exhaustion from the sloughs, which are liable to form on the sacrum. Should the neck of the bladder and sphincter ani have lost their functions, the prognosis will be more unfavourable than when the fæces and urine pass voluntarily.

The prognosis in local paralysis varies according to circumstances. If it depend upon division or morbid destruction of the nerves going to the part, the disorder is incurable, but when they are compressed only, the continuance of the paralysis will depend upon the greater or less facility of removing the compressing cause. The paralysis from lead and mercury is, generally speaking, curable, although some cases have resisted every kind of treatment. The longer the individual has been exposed to the poison, and the more complete and extended the disorder, the more unfavourable should be the opinion as to the result.

Treatment. As paralysis is only the effect of some morbid lesion acting directly or indirectly on some part of the nervous system, our treatment must have reference to the pathological conditions on which it depends. The means of combating congestion, inflammation, structural disorganisation and other alterations, of which paralysis is occasionally symptomatic, have already been fully treated of in several articles to which we refer. (**See APOPLEXY, INFLAMMATION OF THE BRAIN, HYDROCEPHALUS, and SPINAL DISEASES.**) In

this place, therefore, we shall only describe the treatment of paralysis in its chronic form, or when it is purely local.

When paralysis is chronic, the indications are, 1. to remove the morbid conditions on which it depends, by such means as act on the system generally; and, 2. by a stimulating line of treatment directed to the paralysed part, endeavour to excite the nervous branches to a due performance of their functions. With a view of condensing what we have to state on this subject, we must remark, that the same treatment applies to all forms of paralysis, the various remedies being in general the same, although different parts of the system are affected. Whenever any particular exceptions occur, they will be mentioned.

The general treatment of chronic paralysis must depend upon the age and constitution of the individual. If plethora be present, with the usual signs of increased vascular action, the diet should be low and of a digestible nature. But when there are evidences of debility, light nutritious food should be taken, combined with tonics and moderate stimulants, such as a glass or two of wine at dinner. In all cases the secretions and excretions are to be regularly attended to, and solicited, if necessary, by medicines, the strength of which must have reference to the state of the constitutional powers. Moderate exercise in a carriage, or so managed as to call into action the paralysed limbs, may be permitted according to circumstances. In local paralysis of the arms and hands, alternately elevating and depressing a weight suspended on a wheel, which weight is gradually increased, has been found beneficial. When the legs and feet are affected, walking, short of fatigue, with such support as may be necessary, is the best exercise. Paralytics should never expose themselves to bad weather, or to sudden changes of temperature, and flannel should be worn next the skin. The propriety of change of air and scene, visiting some of the retired watering places, different kinds of amusements, mental or corporeal, and various other remedial means, must depend upon the nature of the case and the discretion of the practitioner.

The second indication is to be fulfilled by the use of such stimulants as act more particularly on the paralysed parts. These remedies, judiciously employed, have often succeeded in removing the disorder, but for the most part are only applicable when all danger from increased action of the vital powers has ceased. We shall mention such as have obtained reputation in this class of disorders.

With a view of stimulating the nervous extremities, and rousing them to a proper performance of their functions, frictions by the hand or flesh-brush, stimulating liniments of turpentine, tinct. lyttæ, croton oil, and the concentrated acids or alkalies, mixed with oil or lard, strong saline solutions, &c. have been used with occasional benefit. In hemiplegia, when applied to the scalp on the side of the head opposite to the paralysis, they may be useful in facilitating the absorption of the coagulum. Sinapisms, blisters, issues, and setons, have been applied to the neighbourhood of the supposed injury, and are indicated when paralysis follows the drying up of any old sore. In chronic paraplegia this line of treatment over the vertebral column, is the most powerful means we can employ. Pott recommended caustics on each side of the spine, and they have been used since his time with great success. Larrey, Dupuytren, and others, have employed the moxa in the same situation with much benefit, and the actual cantery is perhaps one of the most powerful and useful remedies of this class. Counter-irritation produced by the tartar emetic ointment, or the powder sprinkled on the blistered surface, has been followed by considerable relief. The Acetum Lyttæ, employed in this way, has been found a useful and cleanly application in local paralysis of the face.

Electricity and galvanism have been extensively employed. A paralytic individual is said to have been cured when on board a vessel which was struck several times by lightning, and another instance of recovery is stated to have followed a hundred strokes of the *Gymnotus electricus*. A case of hemi-

plegia cured by a thunderbolt striking the house in which the patient rested, is reported. (*Arch. Gén. de Méd.*, tom. ii. 1836.) No doubt this is an agent which, properly and judiciously employed, is of great service in local and partial paralysis, but great caution is necessary in its application. It has been found beneficial in numerous cases, since it was first introduced for the treatment of this disorder by M. Jalabert in 1747, but, in a host of others, has produced no amendment, and has latterly fallen into undeserved neglect. The reason of this may, in a great measure, be attributed to the insufficiency and improper state of the apparatus often employed. From many trials we have seen made of this remedy, it appears that the method of passing shocks through the part is not so beneficial as insulating the patient, and drawing sparks from the affected surface. In this manner, many cases which have come under our notice have been perfectly cured by an electrising quack, and a great number of others much relieved; but the apparatus was very large, of great power, and kept in the most perfect order. The stimulating effects of this remedy, however, may be injurious in plethoric states of the system, attended with vertigo. In such cases antiphlogistic medicines should be given, with a view of diminishing the vascular excitement, before having recourse to it, and care should be taken not to continue its application when symptoms of cerebral or spinal irritation appear. It is also dangerous after recent apoplectic attacks from hæmorrhage, and should not be used until sufficient time has elapsed for the coagulum to be absorbed.

Galvanism also has been used in several cases with great success, and by some is preferred to electricity. Dr. J. L. Bardsley, in particular, has highly recommended its use, and has given cases in which its beneficial operation was very manifest. The same precautions must be attended to in the use of this remedy, as in that of electricity. Dr. Castana has cured a great number of patients labouring under facial hemiplegia by galvanism, and applies it by placing the positive wire inside the lips and cheeks, and the negative wire externally on the face in the course of the nerves. (*Journ. des Connais. Méd. Chir.*, Dec. 1835.) It results from the researches of Pichonnière, confirmed by the observations of Bottu-Desmortiens, that galvanism excited by certain acids, as the nitric, produces more pain than when others are employed, as the sulphuric. (Bottu-Desmortiens, *Thèse*, 1834, No. cccxv.)

Both electricity and galvanism have been found most useful in the various forms of paralysis, arising from exposure to cold, metallic poisons, and in cases unconnected with structural disorganisation. They have been found beneficial, also, in certain cases of amaurosis, cophosis, and aphonia, and may be conjoined with the administration of other remedies.

In partial paralysis of the face, electro-puncturation has been found beneficial by Pichonnière, Bally, and Montault. The latter cured a severe case of this description, with neuralgia of the portio dura of the same side, by inserting a needle through the nerve at its exit from the stylo-mastoid foramen, and four others in the course of its principal branches, and transmitting from the former to the latter a number of shocks once a day, from a pile of thirty couples.

Strychnia and brucia. Various remedies, which owe their activity to the presence of these alkaloids, have been given with success in several cases. Dr. Alderson of Hull recommended the rhus toxicodendron, M. Fouquier the nux vomica. The arnica montana, or leopard's-bane, rhus vernix, or varnish-sumach, and Ignatia amara, or St. Ignatius's bean, &c. have also been given. The alkaloids themselves are now generally used, as the doses may be better regulated. Andral, from comparative trials, has established that six grains of brucia are equal to a quarter of one grain of pure strychnia. This drug acts as a powerful stimulus to the muscular system, and especially on paralysed parts, a circumstance Dr. M. Hall attributes to the augmented irritability in such parts. It produces involuntary contractions in the muscles affected, and in large doses general spasms of a tetanic nature, delirium, and death. It is

seldom met with pure, and its strength consequently varies. The twelfth to an eighth of a grain should be taken for a dose in the form of pills, which is to be cautiously increased. Dr. A. T. Thomson recommends the acetate as a preferable preparation, which is readily procured by dissolving one grain of the alkaloid in a fluid drachm of distilled vinegar. Six minims should be given at first; this dose to be gradually increased until the tetanic twitchings appear. If there be irritability of the stomach, preventing the internal administration of the preparation, strychnia in powder may be sprinkled on a denuded surface in double the dose given by the mouth. It is always necessary to produce twitchings and slight spasms of the paralysed parts, before any benefit can be expected, and in several cases the restoration has been found proportionate to the severity of these. Numerous instances have been recorded in the British and Foreign Journals, in which strychnia given in this way has been beneficial. Dr. J. L. Bardsley mentions twenty-three cases of paralysis, in the majority of which this remedy was undoubtedly beneficial. (*Hosp. Facts and Observ.*) Brucia acts in the same manner, but is not so powerful. Half a grain may be used at first, which may be increased to two grains twice a day. It should always be remembered that these medicines are uncertain in their action, and should not be given indiscriminately. They are contra-indicated if there be cerebral or spinal irritation, and have been found most useful in paralysis which is purely local, and independent of irritation, as in palsy connected with metallic poisoning and rheumatism, although they have been occasionally beneficial in hemiplegia and paraplegia. They should, however, be employed with the utmost caution, and not resorted to till other means have failed.

The warm bath is beneficial in many cases of partial paralysis, especially hemiplegia. The Bath waters have been much extolled, and their moderate use, conjoined with other remedies, may be serviceable. Care must be taken, however, that they are not used too long, or too frequently, as under such circumstances they are apt to prove relaxing. The cold bath has been employed, and is spoken favourably of, by Cullen. The same cautions are necessary in its use, as we have just mentioned with respect to the warm bath, as when long continued, or too cold, it is a powerful sedative. It is consequently inadmissible in persons of a debilitated constitution. Such individuals derive more benefit from the tepid bath, the temperature of which should be gradually lowered as the general strength of the patient improves. The vapour bath has been found very useful in the paralysis from lead complicated with colic.

Opium and hyoscyamus may be given in some forms of paralysis attended with much pain, when there are no severe cerebral symptoms. In partial paralysis of the face, attended with distressing pricking or lancinating pains, we have seen opium plasters applied over the parts, where the affected nerves come out on the face, often useful. These remedies may also be given internally in such cases, to relieve the watchfulness which is often harassing.

BARBIERS.

Symptoms.—Causes.—Morbid Anatomy.—Diagnosis.—Treatment.

THIS disease was first described by Bontius (*De Medicina Indorum*), but is better known to the Profession from the observations of Dr. Clark (*On the Diseases which prevail in long Voyages in Hot Countries, &c.*, vol. i.), and Mr. Marshall (*Notes on the Medical Typography of Ceylon, &c.*). These writers have separated the affection from Beriberi, with which it has been confounded even by Good,

and shown that while the latter is a disorder allied to the dropsies, that of which we now treat is purely nervous.

Symptoms. The disease usually commences with more or less lassitude and pricking pain, or sensation of formication in the muscles of both lower extremities, accompanied with numbness, tremors, and irregular spasmodic movements during locomotion. Occasionally the forearms and hands are similarly affected, and in some cases the spasmodic action extends to the muscles of the larynx and chest, so that speaking and respiration are performed with great difficulty. As the disease advances, the inferior extremities become more and more rigid, the knees are spasmodically bent, so that the legs are straightened with much difficulty, and instantly relapsed into the flexed position when the effort ceases. These symptoms are increased on standing or walking, these efforts rendering the performance of both unsteady, and at length the patient is incapable of performing either without support. After a time the upper extremities become similarly affected, and inactivity, great torpor, and loss of sound sleep are complained of: the numbness in the affected limbs now increases, till at length they become completely paralytic, much emaciated and contracted, and lose their natural temperature. The general health also suffers; there is loss of appetite, indigestion, wasting, and general sinking of the vital powers; the pulse latterly becomes weak, thready or fluttering, and death takes place, apparently from a gradual decay of the contractility of the muscular fibre.

The above description refers to the severest form of the disease, but more frequently the symptoms are much milder: the affection is essentially chronic, and generally continues several months, and sometimes years.

Causes. This disease is common in several parts of India, but chiefly in Ceylon, and on the Malabar coast. It occurs most frequently in Europeans, and those generally are attacked who are exposed to the land winds, and are intemperate in their habits. (*Lind.*) Wright describes it as most prevalent towards the end of the rainy season, when the night temperature is many degrees lower than that of the day. (*Edin. Med. and Surg. Journ.*, vol. xli. p. 235.) Mr. Marshall states that late comers are more liable than long residents, and that he never noticed it among the inhabitants of the island. Much contradiction, however, prevails regarding the various circumstances which may induce the disease, and a complete memoir on this subject, derived from actual observation, is still a desideratum. As far as our present knowledge however extends, the causes appear to be, "cold and moisture applied to the body; intoxication, irregularities and excesses consequent upon inebriety; violent exercise in the sun; lying down in the open air during the heat of the day; exposure to the cold chilling dews of the night, or sleeping when thus exposed; suddenly obstructed perspiration by currents of air; long fasting, and whatever exhausts the energies of life." (*Copland.*)

The morbid anatomy of this disease, and consequently its pathology, is very imperfect. It appears however to be a species of palsy, affecting more especially the contractility of the muscles, and the functions of the nerves distributed to them. Whether this is to be attributed to morbid changes occurring in the spinal cord, or in the extremities of the nerves themselves, we know not: at the commencement, the disease often resembles chronic rheumatism, and at a later period paralysis from the poison of lead.

Diagnosis. Barbiers may be distinguished from all other diseases by the slow and continual progress of the tremors, spasms, rigidity and contraction of both inferior extremities, with more or less paralysis. Such however is the endless variety of nervous affections, and the almost imperceptible differences which sometimes exist between the exceptional cases of one disorder and those of another, that it is occasionally difficult to say, what (nosologically speaking) is the disease under which certain patients labour. Thus Dr. Bostock has recorded a case occurring in England, in which the symptoms very much resembled those now described; and Dr. Copland says, that for several years he

has been occasionally consulted by a patient, whose complaints are very nearly the same as those which constitute barbers. In the countries however, where the disease is common, the only malady with which it is likely to be confounded is beriberi; barbers may be distinguished by its being essentially chronic, presenting phenomena of a nervous nature, and terminating in death slowly from inanition, whilst beriberi is an acute affection; and although there may be nervous symptoms, it is principally characterised by general œdema, dyspnœa, and the suddenness of its fatal termination, often with symptoms of asphyxia.

The *treatment* of this disease is in every respect similar to that recommended for lead palsy, and creeping paralysis with debility, and we have nothing further to add to what has been recommended in the article PARALYSIS.

INFLAMMATION OF THE EYE.

General remarks on ophthalmic inflammations and their classification. — I. *Inflammation of the conjunctiva.* — (a) *Catarrhal ophthalmia* — symptoms — causes — diagnosis — treatment. — (b) *Purulent ophthalmia of infants* — symptoms — causes — treatment. *Of adults* — symptoms — causes — treatment. — (c) *Gonorrhœal ophthalmia* — symptoms — causes — treatment. — (d) *Strumous ophthalmia* — characteristic symptoms — causes — treatment. — (e) *Variolous ophthalmia* — symptoms and treatment. — (f) *Morbillous and scarlatinous ophthalmia* — symptoms and treatment. — (g) *Erysipelatous ophthalmia.* — II. *Inflammation of the sclerotica* — symptoms and treatment. — (a) *Catarrho-rheumatic ophthalmia* — symptoms, causes, and treatment. — III. *Inflammation of the cornea* — symptoms, causes, and treatment. — IV. *Inflammation of the iris.* — (a) *Acute idiopathic iritis* — symptoms — causes — diagnosis — treatment — varieties. — (b) *Syphilitic iritis* — symptoms, diagnosis, and treatment. — (c) *Rheumatic iritis* — diagnostic symptoms and treatment. — (d) *Arthritic iritis* — symptoms, causes, and treatment. — (e) *Strumous iritis* — characters and treatment. — V. *Inflammation of the retina* — symptoms of the acute — of the chronic — causes — diagnosis — treatment. — VI. *Inflammation of the choroid* — characteristic symptoms, causes, and treatment. — VII. *Inflammation of the lining membrane of the aqueous chamber, and of the lens and its capsule.*

THE eye is a very complex organ, exhibiting in its structure almost every tissue of which the body is composed, besides several peculiar to itself, as the cornea, the iris, the choroid, and the retina. From the varied character of its component parts two inferences may be drawn, viz. its liability to many different diseases, and its possession of a wide range of sympathies, through which its vital phenomena may be variously influenced.

Its diseases therefore are more or less identical with those of the other organised tissues, and the same principles of treatment are applicable to both. Dr. Mackenzie has very justly remarked, that the knowledge of the inflammatory diseases of the eye has been greatly retarded by the practice of confounding them all under the name of ophthalmia, and thus overlooking both the seat of the disease and the peculiar nature of the inflammation. The consequence of thus viewing all those diseases without discrimination, has been a method of treating them equally preposterous. We find, for example, that the remedies which in the course of a few days are sufficient completely to remove inflammation of the conjunctiva, only aggravate inflammation of the sclerotica or iris, while the plan of treatment which speedily cures scleritis or iritis, if trusted to in conjunctivitis, would expose the eye to almost certain destruction. (*Pract. Treat. on Dis. of the Eye.*)

The symptoms of the ophthalmia generally may be considered under two heads,—the *objective*, or those which we ascertain by the direct exercise of our senses, and the *subjective*, or those which we gather from the testimony of the patient. Among the former, the increased vascularity of the part is a condition generally well marked; and as the arrangement of the bloodvessels is peculiar, and generally constant in different species of ophthalmia, it forms an indication of much value in their diagnosis. A simple inspection of their appearance is frequently sufficient to denote the nature and seat of the malady, without the necessity of a single interrogation. Four different arrangements of the bloodvessels have been enumerated—the *reticular*, the *zonular*, the *fascicular*, and the *varicous*. The first and third are chiefly seated in the conjunctiva, and are characteristic of diseases of that membrane; the second and fourth belong to the fibrous textures, and are most strongly marked in inflammation of the sclerotica and the deeper tissues of the eyeball. Although perfectly distinct from each other, two or more may be combined, as in the compound ophthalmia. The appearance of the secretion from the eyes should also be attended to, as it differs widely in inflammation of the mucous and fibrous tissues.

Under the second head of symptoms, or the subjective, the nature of the pain is a distinctive mark of some moment in some forms of ophthalmia. Thus in inflammation of the conjunctiva it is of a sandy character, superficial, and felt most during the day; while in inflammation of the sclerotica, iris, and fibrous textures generally, it is deep-seated, pulsative, and strikingly nocturnal, affecting the circumorbital region as much as the eye itself; commencing soon after sunset, it increases in violence till after midnight, and abates towards morning. Ophthalmia, attended by the conjunctival or sandy pain, are generally curable by external applications: those accompanied by the pulsatory circumorbital pain always require depletion.

With regard to the classification of ophthalmic inflammations, the most simple and practical appears to be according to the structure in which they are seated. This we propose to adopt, following very nearly that given by Dr. Mackenzie in his *Treatise on Diseases of the Eye*.

I. INFLAMMATION OF THE CONJUNCTIVA.

(a) *Catarrhal Ophthalmia.*

There are three ophthalmia, Dr. Mackenzie observes, which are frequently excited, especially in adults, by atmospheric influences, viz. the *catarrhal*, the *rheumatic*, and the *catarrho-rheumatic*. The first of these is a puro-mucous or blennorrhœal inflammation of the conjunctiva; the second, an affection of the fibrous sclerotica; while in the third, both the conjunctiva and sclerotica are attacked, the symptoms of catarrhal being united to those of rheumatic ophthalmia. (*Op. cit.*, p. 399.)

Symptoms. Catarrhal ophthalmia generally commences with redness and itching of the palpebral conjunctiva, a feeling of stiffness in the eyes, and some degree of lacrymation and intolerance of light, which is succeeded by pricking pain, accompanied with a sensation as of sand or some other foreign body beneath the upper eyelid. The intolerance of light (*photophobia*) subsides as the disease advances; but the overflow of tears often continues, probably from the swelling of the lacrymal passages presenting a mechanical obstacle to their transmission. The vascularity, which first appears on the conjunctiva of the lids, and in slight cases does not extend beyond it, presents itself in the form of irregular clusters of tortuous vessels of a bright scarlet colour, which may be traced advancing from the palpebræ and posterior surface of the globe towards the cornea. As the disease is developed, they gradually assume the reticular arrangement, forming a general network over the whole globe. These vessels are quite superficial, and can easily be moved upon the subjacent textures by pressure with the finger, or motion of the lids. Patches of extravasated blood

are sometimes observed beneath the conjunctiva, or even a pretty general but slight ecchymosis : slight oedematous swelling of the conjunctiva is occasionally observed, but never any thing like true chemosis. The conjunctival secretion is increased in quantity, and becomes opaque and puriform ; sometimes, however, it retains its natural transparency, imparting an appearance of unusual moistness to the eyes, and to the patient a sensation of glueyness. The eyelids are united in the morning by the formation of crusts upon the cilia, of a yellow colour.

Vision is somewhat disturbed by the mucosities which descend upon, and sometimes obstinately adhere to, the cornea. Besides the local symptoms just enumerated, Jüngken of Berlin and Mr. Lawrence mention the occasional appearance at the edge of the cornea of small vesicles or pustules filled with yellow lymph, which burst, leaving round aphthous ulcers of a harmless character. By Dr. Mackenzie this symptom is considered as distinctive of a variety of strumous ophthalmia. When the local symptoms are mild, there is no constitutional disturbance : but in severe cases, and especially when accompanied with the consentaneous affection of other portions of the mucous surfaces, the usual symptoms of pyrexia are developed : when headach is present, it is generally felt across the forehead ; sometimes it does not amount to more than a sensation of weight in the situation of the frontal sinuses. The symptoms are generally of a remittent character, becoming milder during the day, and returning with increased severity towards evening.

Causes. Exposure to the vicissitudes of the atmosphere ; the irritation caused by a glare of reflected light, or by the presence of foreign matters, as dust, &c. in the eye ; over-exertion of the organ by reading or writing to a late hour of the night ; and, generally speaking, all those influences, whether atmospheric or otherwise, by which inflammation of mucous surfaces is usually excited, may be enumerated as the occasional causes of catarrhal ophthalmia. Instances are not wanting, both in this country and on the Continent, in which this disease appears to have prevailed *epidemically* over considerable districts. Its *endemic* existence is of still more frequent occurrence.

Besides its origin from atmospherical influences, some authors are of opinion that it is decidedly contagious, especially in those cases in which the discharge is distinctly puriform ; and that the conveyance of the matter by the fingers, nails, &c. to a sound eye, "will excite a conjunctivitis still more severe, more distinctly puriform, and more dangerous in its effects upon the cornea, than was the original ophthalmia." (Mackenzie, *Pract. Treat.*, p. 403.) We have certainly observed some facts which tend to confirm the opinion of its being propagable by contact.

Diagnosis. From rheumatic ophthalmia, or inflammation of the fibrous membrane of the sclerotica, the catarrhal is distinguished by the absence of circumorbital pain and intolerance of light, by the predominance of the mucopurulent over the lacrymal secretion, and by the position, colour, and arrangement of the bloodvessels, which form a striking contrast in these respects to the pinky hue and deep-seated, parallel, radiated course of those observed in sclerotitis. We frequently find these diseases combined, when the symptoms present a mingled assemblage of those peculiar to each, although one or other generally predominates. (See *Catarrho-rheumatic Ophthalmia*.) Occurring in individuals of a strumous habit, catarrhal ophthalmia presents various modifications, for an account of which we must refer to the description of strumous inflammation of the eyes.

"From *purulent ophthalmia* it is distinguished by its much milder character ; yet the two affections approximate, especially when we compare the severest catarrhal with the mildest purulent inflammation ; the difference is rather in degree than kind, unless it be established, which it is not at present, that the latter always is, and the former always is not, contagious." (Lawrence, *Treat. on the Dis. of the Eye*, p. 155.)

Treatment. If the patient is young and plethoric, the local symptoms

severe, and the general febrile disturbance considerable, venesection may be necessary, followed by cupping or the application of leeches, and perhaps scarification of the conjunctiva. The leeches should be placed in the hollow of the temple, over the cheek bone, or upon the side of the nose over the angular vein, and not upon the lids. Scarification of the conjunctiva ought to be performed by making one or two deep incisions with a lancet, the point of which is rounded off, the whole length of the inner surface of either eye-lid; a considerable discharge of blood will take place, and by proper management of the lids it will continue to flow for some time. The bowels should be well cleared by one or two doses of a brisk purgative, and the action of the skin promoted by the use of warm pediluvia and diaphoretic medicines, as Dover's powder, the *Liq. Ammon. Acetat.*, or tartar-emetic in small doses. Abstinence from animal food and fermented liquors should be enjoined, and the action of the bowels should be maintained by occasional doses of the neutral salts. If the weather be fine the patient may be permitted to go out, and if the light be found to irritate the eyes, a broad pasteboard shade, covered with green silk or calico, should be worn.

With regard to local applications, a variety have been proposed, both astringent and soothing, and either cold or tepid. During the acute stage, a mild tepid application is generally the most agreeable to the feelings of the patient, and most in accordance with what common sense would dictate. We may use, for this purpose, either warm water or decoction of poppy-heads, which should be applied by means of a piece of flannel or soft sponge wrung out of the liquid and held beneath the eye, in order that it may be enveloped in the steam. Any mild unctuous substance, as the *Ung. Cetac.* or cold cream, should be introduced between the lids at night, to prevent their adherence during sleep. Some practitioners make use of highly stimulating applications from the very commencement of the disease, the propriety of which is very questionable, when the inflammatory symptoms are at all severe. Others, among whom is Dr. Mackenzie, rely upon a local treatment of a moderately stimulating character, combined with measures of general and local depletion. As a collyrium he employs a solution of gr. j of the bichloride of mercury with gr. vj of the hydrochlorate of ammonia in \mathfrak{z} viij of water, to be used tepid several times daily. The sandy pain is relieved and the inflammation abated, by dropping into the eye, once or oftener daily as circumstances may require, a solution of gr. iv of nitrate of silver in \mathfrak{z} j of distilled water; and the bulk of a grain of hempseed of an ointment containing gr. iss of red precipitate to \mathfrak{z} j should be smeared along the edges of the palpebræ at bedtime.

If the disease manifests a tendency to become chronic, a blister applied to the nape or behind the ears, and kept open, will prove serviceable. The condition of the internal surface of the lids should be frequently examined; if rough and sarcomatous, it will be necessary to scarify the lining membrane and touch it lightly with the solid sulphate of copper or nitrate of silver.

While we are of opinion, that general remedies in this disease are by no means to be relied upon, and that great evil frequently results from their exclusive employment, we believe that there are many local applications which may be used with nearly equal advantage. The solution of alum and of the various metallic salts have each their advocates, and in the hands of judicious practitioners have each succeeded in effecting a cure. With regard to the treatment recommended by Dr. Mackenzie, we can confidently testify to the success which attends it both in his practice and our own.

(b) *Purulent Ophthalmia.*

Purulent ophthalmia occurs under three different forms, which are yet essentially the same disease; the two first distinguished only by circumstances arising out of the age of the patient, the last (*gonorrhæal ophthalmia*) presenting some peculiarities which are perhaps referrible to the specific nature of the cause. (See Lawrence's *Treatise*, p. 163.)

Purulent Ophthalmia of Infants. This form generally commences on the third day after birth, although it may occur a few days later, and during the first stage is confined to the mucous lining of the palpebræ. The edges of the lids are observed to adhere firmly by a hardened secretion, and present a redder appearance than natural, especially towards the angles. If the lids are separated, a drop of thick white fluid escapes from between them, and on everting them we find the conjunctival lining red and villous, while that investing the globe is natural. During the second stage there is progress in all the symptoms: the swelling and vascularity of the conjunctiva increases; the purulent secretion becomes copious, firmly uniting the edges of the lids, collecting beneath them, or oozing out in considerable quantity when they are separated, and the palpebral integuments assume a dark red hue. The child keeps its head constantly averted from the light and its eyes shut, if they are not already closed by the tumefaction of the lids. The chemotic swelling of the conjunctiva, pressed upon by the orbicularis muscle, causes eversion of either or both lids, which may be permanent, or only occasional during a fit of crying, or on attempting an examination of the affected organ. The discharge from the eyes, though generally of a yellow colour, may present a greenish hue in unhealthy children; sometimes it is ichorous or mixed with blood, or whitish in appearance. The disease may continue in this state for eight days or even longer, without any injury to the transparent parts, further than a slight haze of the cornea. About the twelfth day purulent infiltration of the cornea is liable to occur, and that membrane gives way by ulceration, either in a spot of circumscribed dimensions, or throughout its whole extent, so that on examining the eye after the occurrence of this untoward accident, we may find merely a small penetrating ulcer with a hernia of the iris, or the whole cornea destroyed and the humours prolapsed through the pupil. The other injuries to vision consequent upon this ophthalmia are, opacity of the cornea from interstitial deposit either into the conjunctival layer or into its substance, producing a loss of transparency varying in degree from a thin bluish grey film to complete opacity, and limited to a circumscribed portion, or including the whole extent of the cornea. Adhesion of the iris to the cornea, constituting what is termed "synechia anterior," may also occur; and finally a central opacity seated in the anterior hemisphere of the capsule of the lens, generally about the size of a small pin's head, is a not unfrequent result of this ophthalmia. Both eyes are usually attacked, either simultaneously or with an interval of several days. The constitutional symptoms accompanying the complaint are, restlessness, loss of sleep, a loaded tongue, and disordered bowels; if it is neglected, feebleness and emaciation frequently result from the prolonged irritation.

Prognosis. Though purulent ophthalmia be very manageable in its early stages, in the advanced it assumes a serious character, especially if neglected or mismanaged. The issue, therefore, depends on many circumstances. If the cornea still retain its transparency, however violent the inflammation and profuse the discharge, the sight will be preserved, although the cure may be tedious if the disease has been allowed to establish itself. Opacity from thickening of the corneal conjunctiva will disappear completely, but superficial ulceration of the cornea, or morbid deposition in its substance, will lead to the production of opacities more or less injurious to vision; and if purulent infiltration has taken place, the organ may be destroyed and vision permanently lost. Protrusion of the iris through a penetrating ulcer of the cornea will occasion a permanent alteration in the form of the pupil; and should this occur in the axis of vision, total loss of sight may result from the pupillary margin of the iris becoming engaged in the aperture: in such cases vision may perhaps be restored in after life by an operation for artificial pupil. If there is central capsular opacity, the probability is that it will remain unaltered, and though vision may improve by the expansion of the pupil as the child advances to maturity, permanent shortsightedness may be occasioned.

Causes. Authors agree in referring this complaint, in the majority of instances, to the inoculation of the conjunctiva during parturition with leucorrhœal, gonorrhœal, or some other morbid discharge: its occurrence, however, in the offspring of apparently healthy mothers who deny the existence of vaginal discharge in any form, must leave the source of the disease, in such cases at least, doubtful, and hence its contagious origin still remains open to dispute. Simple catarrhal ophthalmia may, however, possibly degenerate into this form of disease under the influence of various causes which tend to impart to it a degree of malignancy.

Treatment. Before proceeding to the employment of curative means, it is of great importance that we should ascertain distinctly the actual condition of the affected organ, and especially the progress which the inflammation has made with reference to the transparent parts. This of course can only be satisfactorily accomplished by separating the lids and exposing the cornea, an operation which is frequently rendered very difficult by the state of the parts and the restlessness of the little patient. Nevertheless, when it can be accomplished without the exercise of undue violence, it ought to be attempted, and by adopting the following suggestions of Dr. Mackenzie we shall generally succeed:—Let the surgeon, after spreading a towel upon his knees, receive between them the head of the infant, which the nurse, sitting opposite and a little to one side of him, supports across her lap. On attempting to separate the lids by drawing at the skin, eversion almost invariably takes place from the contraction of the orbicularis muscle upon the swollen conjunctiva; we must therefore place the points of the fingers against the anterior edges of the tarsi, and press them firmly but gently backwards over the globe. If we fail in obtaining a view of the cornea, we must rest satisfied with what information can be obtained from the external condition of the lids and the nature of the discharge which issues from beneath them.

In the acute stage of the disease if there is bright redness and swelling of the ocular conjunctiva, and especially if the cornea is hazy or in a doubtful condition, it will be necessary to abstract blood from the part; and even when we cannot see the eye itself, if the palpebræ are much swollen and of a bright red externally, local depletion is not less advisable. It may be effected by scarification of the inflamed membrane, or, what is better, the application of a single leech to the upper eyelid: from the vascularity of the skin it will bleed freely, and this is generally followed by marked diminution of the inflammatory symptoms. One leech is generally sufficient, or at most two, even in robust children. The bowels should be opened with castor oil or magnesia, which may be repeated occasionally. When the tongue is white and the inflammation active, a grain or two of calomel may be given once or oftener as required; small doses repeated daily are often very beneficial. Counter-irritation by blistering has been recommended, but unless absolutely necessary, it is better to avoid it in infants. The eyes should be frequently bathed with tepid water, gently separating the lids and removing the purulent matter with a bit of soft sponge; the upper and lower lid are alternately to be everted and wiped clean; if the former remains everted, it may be easily replaced by compressing the swollen conjunctiva and bringing down the edge of the lid. A little cold cream or fresh butter should be smeared along the edges of the tarsi to prevent their adhesion, and consequent dilatation of the palpebræ by the accumulated discharge. Having subdued the violence of the inflammatory symptoms by the use of antiphlogistic means, we must have recourse to astringents, which may be used with more safety and advantage in this ophthalmia than in any other. For this purpose we may employ the bichloride of mercury collyrium already mentioned, or a solution of gr. iv of alum, which may be gradually increased to gr. x, in $\frac{3}{4}$ j of water. With either of these washes the eyes ought to be bathed three or four times in the twenty-four hours, and the fluid injected with a syringe between the palpebræ. As it is advisable to vary the stimulant occasionally, the solution of the nitrate of silver (gr. iv to $\frac{3}{4}$ j of water) should

be applied daily with a large camel's hair pencil to the whole surface of the inflamed conjunctiva, after cleaning it as already directed.

When disorganisation of the cornea is threatened, and the constitutional symptoms indicate debility, the system must be supported by tonics, as quinine, in doses of gr. ss twice or thrice daily. If the conjunctiva continues in a relaxed condition during the decline of the disease, we may touch it daily with the Vin. Opii; or if it presents a sarcomatous or granular appearance, strong nitrate of silver ointment or the solid caustic may be applied. Mr. Guthrie employs an ointment consisting of ten grains of nitrate of silver in an ounce of axunge from the very first. Its application in the acute stage of this or any other ophthalmic inflammation must be attended with great pain, and we are not aware of any particular advantage which it possesses over the treatment just recommended. With the exception of Mr. Guthrie himself, we do not find any author of experience who seems to favour its application, unless in the chronic stage, when a powerful stimulant is universally allowed to be beneficial. As the purulent discharge in this disease is highly contagious, those in attendance on the child should be made aware of the fact, and cautioned against whatever might favour its communication to themselves or others.

Purulent Ophthalmia of Adults. This form, known also by the name of Egyptian Ophthalmia, when severe, is a most formidable disease, sudden in its attack, rapid, and often uncontrollable in its progress, and destructive in its effects, varying in degree from a slight affection of the conjunctiva of the lids to an intense inflammation of all the structures of the eyeball, and frequently terminating in ulceration and rupture of the cornea, with destruction of vision. It generally affects both eyes, though not simultaneously, and commences with an itching uneasiness in the conjunctiva of the lids, or a sudden sensation, as of a particle of sand lodged between the eyelids and globe: next morning the palpebræ are found to be adhering, and the lining membrane is highly vascular and greatly swollen. The discharge is profuse; at first mucous it speedily becomes purulent, collecting in considerable quantity in the interstices of the tumified membrane, and escaping abundantly from between the eyelids, irritating and excoriating the skin of the cheeks over which it flows. The swelling of the conjunctiva continues to increase, and in severe cases is raised by the inflammatory œdema in the form of pale red soft elevations, or chemosis, round the cornea, so as at times completely to overlap and conceal it, producing excessive distension of the palpebræ, or protruding from between them and causing eversion. The pain varies in degree, according to the textures which are involved; if the conjunctiva alone suffers, it is inconsiderable, but when the deeper and firmer tissues are attacked, it becomes almost insupportable. It is felt chiefly in the neighbourhood of the orbit, and is of an aching, pulsative character, subject to remissions and exacerbations of variable duration. There is sometimes hemicrania, accompanied with an agonizing sense of tension in the eye; in other instances the whole head is affected. The presence of light during the paroxysm does not appear to aggravate the pain. With local suffering of such severity, we find some degree of constitutional sympathy in the form of fever, and the general health is at times much impaired by the prolonged irritation.

A characteristic of the disease is its tendency to relapse. When the inflammation has apparently expended its strength, it may be again rekindled and rage with increased violence. Rupture of the cornea, which sometimes occurs during a paroxysm of pain at variable periods from the commencement of the disease, may afford a temporary relief to suffering; but this is not always the case, as sometimes it does not put a termination to the disease, and scarcely even checks its progress. If resolution takes place, the inflammation may issue in the production of various morbid conditions of the eye and its appendages, as vascular thickening of the palpebral conjunctiva with enlargement of its mucous papillæ, commonly called "granular conjunctiva," opacity, ulceration, sloughing, or staphyloma of the cornea, or prolapse of the iris.

The inflammation may subside into a *chronic* form, characterised by a thin gleet discharge, a moderate degree of pain, and a vascular condition of the corneal conjunctiva, dependent upon the rough and thickened state of the lining membrane of the upper lid, by which vision is materially abridged, or even totally destroyed. From this chronic form the disease readily passes again into an active state, under the influence of various exciting causes.

Causes. The opinion of authors is divided as to whether this disease is merely an aggravated form of common catarrhal ophthalmia, or whether it arises from a specific contagion, produced in warmer climates and imported into this country: the weight of evidence is certainly in favour of the former opinion. However originating, there can be little doubt that when it occurs in circumstances favourable for the development of contagious disease, it presents that character, and is capable of being propagated by contact from one individual to another, acquiring additional virulence from the circumstances which at first favoured its origin. That it may also be communicated by miasmata conveyed through the air from the eyes of those infected with the disease, is asserted by Müller, denied by Dr. Vetch (*Pract. Treat.*, p. 179.), and considered doubtful by Dr. Mackenzie (*Pract. Treat.*, p. 419.), who remarks that "in every instance in which this ophthalmia has spread through a regiment, school, or family, there has been a suspicion of actual contact by means of the fingers of the patients, or of the towels or other utensils which they used in common." "In practice," says Mr. Lawrence, "it is the safest course to proceed upon the notion of the complaint being contagious; and, acting upon that notion, to prohibit the use of the same sponges, utensils, or linen, or any other thing capable of communicating the disease from one to the other, just as if the contagious nature were decidedly proved."

Treatment. On this subject Mr. Lawrence remarks (*Treatise*, p. 211.), "there are in short two points to be kept in mind in treating acute purulent ophthalmia — first, to check inflammation by antiphlogistic means, and then to employ astringents: if we proceed on this plan, we shall prevent that chronic thickening and granulation, which are so obstinate and troublesome."

To proceed on these principles, if the patient is robust and plethoric, and there is much deep-seated and circumorbital pain with chemosis of the conjunctiva, general bleeding should be practised. Venesection is preferable to arteriotomy, and equally effectual. The quantity abstracted ought in all cases to be such as will produce a decided effect upon the disease. Dr. Vetch strongly recommends that the blood be allowed to flow till *deliquium animi* is produced. (P. 206.) We must be cautious, however, not to carry this practice too far, as the disease cannot be cured by it alone: the patient's strength may be so reduced, as materially to favour disorganisation in the textures of the eye. After venesection, blood may be abstracted locally by cupping or leeches. In severe cases from twenty to thirty of the latter may be applied round the eye, avoiding to place them upon the lids: this additional depletion should follow the general bloodletting by about two hours. If the symptoms continue unabated, or have increased in severity, the venesection may be repeated in twenty-four or thirty-six hours.

Scarification of the swollen conjunctiva of the globe and eyelids with deep incisions is strongly recommended by Dr. Mackenzie, who regards it as one of the most effectual methods of combating this disease, the copious bleeding which ensues tending greatly to allay the symptoms. *Mr. Lawrence* disapproves of scarifications in cases of acute ophthalmia, as tending to augment the local irritation. Walther advises the excision of large portions of the chemosed membrane after general bleeding has been premised, while Sanson recommends its entire removal, and the cauterisation of the bleeding surface with lunar caustic in substance.

The bowels should be freely moved by mercurial purgatives, which may afterwards be exchanged for milder aperients. Rest, and a strict antiphlogistic

regimen should be enjoined. In mild cases leeching and cupping will probably suffice, with the exhibition of purgatives, which ought not in any case to be neglected, from the powerful sympathetic influence which they exert upon the conjunctiva. As soon as the active inflammation has been subdued, diaphoretics may be prescribed, as a full dose of Dover's powder at bedtime, accompanied with warm pediluvia and diluents. There is a difference of opinion as to the free employment of mercury in this disease. Rust recommends its exhibition when the inflammation is advancing unchecked despite of antiphlogistic measures. Mr. Lawrence states, that his experience corresponds with that of Vetch and Walther, who have seen salivation produced in many instances without the smallest advantage. Dr. Mackenzie considers the exhibition of calomel and opium, preceded by general bleeding, as very useful in severe cases attended with nocturnal circumorbital pain, and advises it to be given in the proportion of gr. ij of the former and gr. $\frac{1}{4}$ to gr. j of the latter every two hours, thrice a day, or only at bedtime, as the case may require, till the mouth is affected. Counter-irritation is of the greatest service; after depletion a suppurating surface should be opened by blistering upon the nape or behind the ears.

The local treatment ought to partake both of a soothing and stimulant character, but the protracted use of the one, or the premature employment of the other, is equally injurious. Cold applications to the inflamed organ have been recommended by high authorities, as of great utility in reducing the vascular action. If perseveringly employed, on the first appearance of the disease, no doubt this may be the case; but when the inflammation is fully developed, the feelings of the patient must be generally against them. Mr. Travers decidedly prefers a tepid application in the painfully acute stage of inflammation, an opinion in which we concur. Considerable benefit is sometimes derived from exposing the eye to the vapour of hot water and laudanum, and the temples may be rubbed with warm laudanum before the nocturnal attack of circumorbital pain sets in. The purulent discharge should be frequently and carefully removed from the eyes with the bichloride of mercury collyrium used tepid, and injected over the whole conjunctival surface by means of a syringe. Dr. Vetch recommends very strongly an infusion of tobacco, in the proportion of 3ij of the leaves to $\bar{3}$ viij of water, and the undiluted Liquor Plumbi Diacetatis, as collyria in this stage of the disease. (*Op. cit.*, p. 211.) Some mild application should be applied to the edges of the eyelids at bedtime. When the acute inflammatory symptoms have been subdued, the treatment must be changed, and astringents of greater activity employed: the gr. iv solution of the nitrate of silver is one of the best, and ought to be dropped into the eye every five or six hours, or whenever the raw painful feeling is renewed: in the intervals the bichloride of mercury collyrium may be continued, or a solution of alum (gr. iv to gr. x in $\bar{3}$ j of water). The red precipitate, or the citrine ointment, which is highly recommended by Sir. P. Macgregor, may now be substituted for the milder applications previously used. Mr. Briggs employs the Ol. Terebinth. introduced between the lids, as an effectual means of checking the profuse discharge: he applies it in minute quantities with a camel's hair pencil, afterwards bathing the eye with cold water till the heat and uneasiness produced is allayed. In employing astringents it is necessary closely to watch their effects, discontinuing their use, and having recourse again to antiphlogistic measures upon any renewal of the inflammation and pain. With change of local treatment may be conjoined better diet, exposure of the eyes to light, and exercise in the open air. Dr. Vetch and Mr. Murray speak highly of the good effects of exercise in the open air upon the soldiers affected with this disease, even during the existence of chemosis and purulent discharge.

As the state of the pupil frequently cannot be ascertained during the progress of this disease, the extract of belladonna ought to be rubbed into the forehead or temples to dilate it, and prevent those abnormal adhesions of the iris which,

though comparatively rare in any of the puro-mucous ophthalmiæ, occasionally take place to the cornea from a penetrating ulcer.

Evacuation of the aqueous humour by puncturing the cornea has been suggested as a means of relieving the intense pain of the eye and head, and preventing the rupture of that membrane. Sir. P. Macgregor, who performed it in twenty-three cases, speaks very favourably of its good effects. If ulcers form upon the cornea, they must be touched with the lunar caustic pencil sharpened to a point. This practice is especially useful when a portion of iris protrudes through the ulcer. Spreading ulceration of the cornea attended with debility will require a decided tonic and stimulating treatment, viz. good diet with porter or wine, quinine, and local astringents. (*Lawrence*, p. 211.) The Vin. Opii is an excellent application in the relaxed condition of the conjunctiva, which frequently remains after the acute inflammatory symptoms have disappeared, and the puriform discharge has ceased. Besides the plan of treatment above recommended, and which in general we should consider the safest and the best, it has been proposed by some authors of experience and merit, to cut short the disease at the commencement by the free use of powerful astringents; and certainly their testimony goes far to establish the utility of this practice while the disease is confined to the mucous lining of the palpebræ, or is just beginning to spread to the conjunctiva of the globe. Dr. Ridgway employed the gr. x solution of the nitrate of silver, to which Dr. O'Halloran added the use of the sulphate of copper in substance, which he freely applied to the inner surface of the eyelids, not only in the early stage of the disease, but also when the purulent discharge and chemosis were fully established. Mr. Guthrie's nitrate of silver ointment may be employed for the same purpose; but if we deemed it advisable in any case to adopt this mode of treatment, we should certainly prefer the lunar caustic pencil rapidly passed over the diseased membrane to any other form of stimulant.

(c) *Gonorrhœal Ophthalmia.*

Having already given a detailed account of purulent ophthalmia in the adult, we shall not describe at length the symptoms or consequences of this disease, which differs from that referred to rather in origin and degree than in kind. The vehemence of its attack, and the rapidity with which it runs its brief but destructive course, render gonorrhœal ophthalmia decidedly the most dangerous inflammation to which the eye is subject, and fortunately it is one of the most rare.

The *symptoms* are those of ordinary purulent ophthalmia in the highest degree of development, intense general external redness, great vascular congestion, chemosis and swelling of the lids, and profuse yellow discharge. The palpebral and ocular conjunctiva are generally attacked simultaneously, and to this membrane the inflammation is at first confined, but speedily extends to the cornea and fibrous tissues of the eyeball, this being marked by severe and agonising pain of the globe, orbit, and head, accompanied with general febrile disturbance. Such a combination of symptoms indicates the most imminent danger to the organ; and indeed, if the inflammation has spread beyond the mucous membrane, we can scarcely expect by any treatment to arrest completely its destructive course. From the excessive swelling and eversion of the lids and the great chemosis, it is frequently impossible to ascertain the precise condition of the cornea. When the pain is intense, we may suspect its implication in the disease; but sometimes that symptom is very slight in degree, or even entirely absent. The symptoms are by no means of equal severity throughout the progress of the disease, being generally aggravated as the inflammation advances from the yielding membrane of the palpebræ to the denser textures of the globe. The principal disorganising changes to be apprehended are thus concisely stated by Mr. Lawrence: "The immediate effects of this inflammation upon the cornea are, sloughing, suppuration, ulceration, and interstitial deposition, while the conse-

quences to which these changes lead more remotely are, escape of the humours and collapse of the globe, obliteration of the anterior chamber and flattening of the eye, staphyloma, prolapsus iridis, obliteration of the pupil, corneal opacity, and anterior adhesion of the iris." (P. 220.)

Causes. Gonorrhœal ophthalmia has been referred, 1. to the inoculation of the conjunctiva with the matter of gonorrhœa; 2. to metastasis of the inflammation from the mucous lining of the urethra to the analogous tissue of the eye. With reference to the first, the cases related or referred to by Messrs. Allan (*Syst. of Path. and Oper. Surg.*, vol. i. p. 153.), Mackenzie (*op. cit.*, p. 438.), and Lawrence (*op. cit.*, p. 227.), sufficiently establish in our opinion the possibility of its being thus communicated. With regard to the opinion of its metastatic origin, it is probably erroneous: the testimony of observation is certainly against its occurrence. In none of the cases observed by Mr. Lawrence, in which this ophthalmia coexisted with or supervened upon gonorrhœa, was the urethral discharge stopped; and although generally lessened in quantity, it continued in some instances with little diminution; while, on the other hand, the sudden suppression of gonorrhœal discharge, when effected by surgical means, is not succeeded by inflammation of the eyes.

Treatment. The antiphlogistic plan in all its details has been carried to its utmost extent in this disease, and with very variable success, in some instances proving effectual for the preservation of sight, while in others it has as signally failed, and indeed, "in many cases the result must be unfavourable whatever plan is adopted; because, from the rapidity and violence of the disorder, irreparable mischief has been done before assistance is demanded."

It has been proposed to cut short the disease in its early stage by the application of strong astringents and escharotics, as the gr. x solution, or the ointment of the nitrate of silver. From the frequent failure of the antiphlogistic mode of treatment this method is worthy of a trial in favourable cases, as when the inflammation has not yet extended beyond the conjunctiva; and even when the cornea is affected, from the generally unfavourable termination of such cases under any plan of treatment, Mr. Lawrence thinks that these local measures might still be tried, bloodletting being premised or accompanying their application. (P. 230.)

If antiphlogistic measures are determined upon, they must be vigorously pursued to be of any service. Provided the cornea is still uninjured, in a doubtful condition, or only partially sloughed, we may hope by copious and repeated venesection to preserve its integrity in the former case, or some degree of vision at least in the latter. If suppuration and sloughing to any extent has taken place, such activity of treatment is unnecessary, though moderate depletion may still be requisite. In some cases general bleeding is demanded for the mere relief of the intense suffering attendant upon the disorganisation of the denser tissues of the eyeball without any reference to the preservation of sight.

Having thus checked the extreme violence of the inflammatory action, the local abstraction of blood by leeches, scarification, or excision of a portion of the chemosed membrane, will probably suffice for the removal of the slight remaining symptoms. The bowels must be freely moved by active purgatives, and their due action, as well as that of the skin, maintained by appropriate means: a low diet and rest will complete all that is necessary in the treatment of the acute stage of this disease. Dr. Mackenzie recommends the employment of calomel and opium, as in contagious ophthalmia: counter-irritation may be resorted to as an auxiliary means, antiphlogistic measures having been premised. The eyes should be frequently bathed with the bichloride of mercury collyrium to remove the discharge, and the edge of the lid smeared with some mild unctuous substance. When the inflammation has been completely checked, leaving the patient pale and weak from the effects of the previous treatment, it may be sometimes necessary to give general tonics, as quinine, and employ astringents locally, though Mr. Law-

rence thinks such measures are rarely required. Mr. Travers, on the other hand, recommends a careful but prompt exhibition of tonics, with the use of astringent lotions, in this stage of the disease. The best astringent applications are, the alum or nitrate of silver solutions formerly mentioned, with which may be combined the use of the red precipitate ointment. Ulcers of the cornea may be touched with the lunar caustic pencil.

Besides the severe form of disease above sketched, Mr. Lawrence describes (p. 232.) a gonorrhœal inflammation of the conjunctiva, comparatively mild in its symptoms, and much less dangerous in its results; it readily yields to the astringent plan of treatment, rarely requiring antiphlogistic measures, unless in patients of a full habit.

(d) *Strumous Ophthalmia.*

Strumous ophthalmia is peculiarly a disease of childhood, nine tenths of the cases of inflammatory affections of the eyes in young subjects being of this nature. It seldom attacks infants previous to weaning; from that period to puberty is the season of life when it most frequently appears. It rarely occurs however in adults, unless they have previously suffered from the disease.

Strumous ophthalmia has its primary and essential seat in the conjunctiva and Meibomian glands, although it may secondarily extend to the tissue of the sclerotica and iris. It is characterised by moderate vascularity of the conjunctiva, a copious lacrymal secretion, and a degree of intolerance of light which is quite disproportioned to the urgency of the concomitant symptoms.

The palpebræ are firmly closed by the spasmodic action of the orbicularis, and the child seems to be unable to open its eyes by the light of day, even when willing; or if it does succeed by a convulsive effort, the cornea is immediately rolled upwards beneath the margin of the tarsus, so as to be completely hid from view; an effect which equally follows the forcible separation of the lids, and renders an examination of the cornea a matter of no small difficulty. Were we to estimate the severity of the other symptoms by the degree of intolerance of light, we should frequently be surprised, on quickly separating the lids, to find the eye nearly natural in appearance. We mention the *quick* separation of the lids, because an exposure of a few seconds to the light is sufficient to cause copious injection of the conjunctiva, and an appearance of vascularity which it would not otherwise present; a source of fallacy in estimating the amount of inflammatory action present, which it is well to be aware of.

The vessels observed upon the conjunctiva, and sometimes confined to the inner surface of the palpebræ, generally of a somewhat dusky hue, are either single, or arranged in fasciculi, and direct their course to the margin of the cornea, over which they pass, terminating towards its centre. At the extremities of these vessels, small phlyctenulæ or pimples, containing a clear or yellowish fluid, are formed, which speedily burst, and give place to a small round funnel-shaped ulcer. These phlyctenulæ are also observed upon the sclerotica, and very frequently at the line of its junction with the cornea: they vary both as to number and size, being generally smallest upon the cornea.

The degree of pain is generally moderate while the eyes are shaded from the light. When the inflammatory symptoms are active it is considerable, especially during the night. The secretion from the eyes is evidently of an acrid nature, from the irritation it occasions in the nostrils and upon the integuments of the face, which become red and inflamed, and are sometimes affected with a pustular eruption. The foregoing local symptoms are attended with a disordered condition of the stomach and bowels; the tongue is foul; the breath often fetid, and the evacuations of an unhealthy character. The temper becomes irritable and fretful, and this tends to prolong the disease.

Towards evening, especially after sunset, there is a considerable remission in the symptoms, which have been aggravated during the day; a phenomenon which is not observed in any of the other forms of ophthalmia.

Both eyes are usually affected, though not in an equal degree; or the disease may commence in one and pass to the other, or attack them alternately.

The strumous diathesis is further indicated by various morbid appearances in other parts of the body, some of them evidently produced by the acrid secretion from the eyes, others apparently originating in the general unhealthy condition of the system.

From the insidious nature of this form of inflammation, and the frequent absence of any prominent symptom, the most serious organic changes may have taken place in the transparent textures of the eye, tending materially to abridge, or even totally destroy vision, before we are aware of the danger with which they are threatened.

The organic changes most to be apprehended are, ulceration of the cornea, and the deposition of opaque matter in its substance.

The phlyctenulæ which we have already described as forming upon this membrane may be absorbed, and the remaining opacity be entirely removed, or a transparent dimple of the cornea may be left, which is long in filling up. In other cases the opacity is observed to extend itself, and red vessels run into it, forming what is named "vascular speck," which is a very troublesome symptom. More frequently the phlyctenulæ burst, and form ulcers which may be superficial and considerable in extent, but are generally deep and infundibuliform. This change is usually preceded by the appearance of red vessels running to the phlyctenulæ, a symptom indicative of much danger to the eye, from the frequency with which the ulcer penetrates to the anterior chamber, causing protrusion of the iris, and subsequent adhesion of that membrane to the cornea. The ulcer, when healed, leaves an opaque permanent cicatrix, which however may be in some degree lessened by contraction upon itself, or by the growth of the patient. If several phlyctenulæ coexist upon the cornea, they may unite previous to bursting, infiltrating their contents into the substance of the cornea, and forming a species of onyx, which is sometimes observed at the edge of the cornea, independently of this cause.

It frequently happens, that while the entire thickness of the corneal substance has been penetrated by an ulcer, the lining membrane of the aqueous chamber still remains entire, and by the pressure of the contained humours is protruded through the opening in the form of a small vesicle, forming what is termed "hernia corneæ." Should this give way, as generally happens, the aqueous humour escapes, the iris is prolapsed, and a dense opaque cicatrix is the result.

If the corneal ulcer has been of considerable size, and the iris extensively prolapsed, the pseudo-cornea which has been formed over the protruded portion of iris, sometimes gives way before the pressure of the humours, forming a partial staphyloma. A general protrusion of the whole cornea may take place from the same cause, when its texture has become weakened by inflammatory action, and the iris is adherent to its posterior surface. The transparency of the cornea may be further impaired by interstitial deposit, or the ramification of red vessels in its conjunctival layer forming a vascular network, which has been named "pannus." The inflammation may be propagated from the cornea to the sclerotica and iris, and may even extend to the deeper-seated structures, producing serious organic changes of the internal parts, especially when the disease is of long standing, and has frequently renewed its attacks. The globe may be enlarged by an increased secretion of the humours, a degree of hydrophthalmia being thus produced; while in other cases it is observed to be dwarfish and atrophic, apparently the result of interrupted nutrition.

Frequent and long-continued attacks of strumous ophthalmia generally leave the eyes in an imperfect condition, and predisposed to become amaurotic, under the influence of causes which would not have similarly affected them in other circumstances.

Dr. Mackenzie (p. 469.) describes, under the name of *Pustular Ophthalmia*,

another form of strumous inflammation of the eye, which differs in several respects from that which we have just described. The subjects of it are generally children of a somewhat advanced age, or young adults. It is not attended with danger to the transparent textures of the eye, and readily yields to a very simple mode of treatment. As its name indicates, it is characterised by the formation of pustules, generally of considerable size, filled with an opaque yellow matter, and usually seated a line or two distant from the margin of the cornea: they burst and are converted into broad elevated ulcers. The vascularity of the conjunctiva is fascicular and confined to the vicinity of the pustules. Sometimes it is pretty general over the surface, and accompanied with conjunctival ecchymosis. This ophthalmia is often combined with catarrhal conjunctivitis. The intolerance of light is generally moderate in degree, sometimes wholly absent; and we never observe the spasmodic contraction of the lids so frequently attendant upon the ordinary form of strumous inflammation of the eyes.

Causes. This form of ophthalmia, as its name implies, occurs in individuals of scrofulous diathesis, in whom the morbid predisposition may be called into action by various causes, as the use of unwholesome food, excess or irregularity of diet, residence in bad air, and neglect of exercise; to which may be added exposure to cold and wet, teething, over-exertion of the eyes, the presence of irritating bodies in the folds of the conjunctiva, slight blows, &c.; and it is a not unfrequent sequela of exanthematous fevers and whooping-cough.

Treatment. Originating as this disease unquestionably does in an unhealthy condition of the system, we cannot expect that any mode of treatment will prove effectual for its cure, which is not in a great measure directed to the improving and confirming of the general health. Unless this ultimate object is kept constantly in view, and perseveringly aimed at, the most appropriate local treatment will prove altogether unavailing.

As strumous ophthalmia is almost invariably attended with an unhealthy condition of the digestive organs, our first care must be to restore and insure the due performance of their functions. It will be necessary to administer purgatives, and those too of an active nature even in young children: large quantities of morbid fæculent matter are thus frequently removed; and a brisk purge, several times repeated, will in some instances suffice to effect a cure. The purgative plan of treatment has been recommended as especially useful when the ophthalmia is accompanied with an impetiginous eruption over the body; but we must be cautious not to carry it too far, from the debility which may ensue. After thoroughly clearing the bowels of their unhealthy secretions, we may exhibit mild alteratives. In some cases attended with heat of skin, a quick pulse, and a foul tongue, we may commence the treatment more advantageously with an emetic, and afterwards small doses of tartar-emetic (to children $\frac{1}{12}$ to $\frac{1}{10}$ of a grain) thrice a day. Antimony combined with the sulphate of magnesia, and administered so as to keep up a state of nausea and catharsis, is a mode of treatment well adapted to acute cases in adults.

Bloodletting, either general or local, is seldom requisite, and intolerance of light alone is not to be regarded as an indication either for its employment or repetition. If there be considerable redness and pain of the eye with general fever, leeches must be applied. It may be necessary to repeat them frequently, if the local symptoms continue urgent and the constitution will bear the depletion; though it must be borne in mind, that depletion alone will not effect a cure, and we may often as effectually subdue the disease, while we save our patient's strength, by the exhibition of tartar-emetic. Repeated bleedings, to the neglect of other means, are highly pernicious; tending to increase the irritability of the affected organ, and by reducing the patient's strength, to render the transparent textures of the eye more susceptible of destructive changes.

Tonics are peculiarly useful in this disease, from their effects in removing the constitutional debility upon which it in a great measure depends. After the alimentary canal has been sufficiently cleared by the exhibition of purgatives, we may commence their use; and the di-sulphate of quinine seems to be the most eligible form. Dr. Mackenzie, who has used it extensively, says, "In most of the little patients to whom I have administered sulphate of quinine, it has acted like a charm, abating commonly in a few days the excessive intolerance of light and profuse epiphora, promoting the absorption of phlyctenulæ, and hastening the cicatrisation of ulcers of the cornea." (P. 460.) A healthful condition of the skin should be promoted by the use of the tepid bath, or daily ablution of the body with tepid salt water, followed by gentle friction. The temperature of the water may be gradually reduced, till the cold plunge, or shower-bath, can be borne with advantage.

Among constitutional remedies we ought not to omit to mention the marked benefit which is frequently derived from change of air, especially by the removal from the impure atmosphere of a large town to the more salubrious air of the country.

Mercury or its preparations, though usually administered in this disease for their purgative effects, are sometimes employed with other intentions. Their deleterious influence however upon strumous habits, should deter us from their exhibition, except as purgatives or alteratives, unless imperatively demanded, as to arrest disorganisation of the transparent textures of the eye. In these circumstances, calomel and opium may be given till the gums are affected, or the Hydrarg. c. Cretâ, either singly or combined with James's powder, or the Pulv. Ipecac. Comp.

Counter-irritation is highly beneficial, and is often effectual in speedily removing the intolerance of light. Its mode of application is a matter of some difficulty in very young subjects, and requires to be conducted with caution. If we prefer a blister, it ought to be applied between the shoulders or behind the ears, and should be removed in six or eight hours at farthest: it is safer to repeat the application after a short interval, than to keep up a discharge by the use of irritating ointments. The position of the child during sleep is a matter of some moment: it ought on no account to be permitted to lie burying its face in the pillows; nor, unless absolutely necessary, should it be allowed to remain in bed during the day.

Local remedies. Scarification of the conjunctiva of the lids has been recommended, especially in chronic cases, and may sometimes be employed with advantage. Warm fomentations are employed with much advantage when the symptoms are at all severe, affording much relief to the photophobia and spasm of the lids. A bit of flannel, or soft sponge, wrung out of a decoction of poppyheads, or chamomile flowers, or an infusion of opium, may be applied to the eyes as hot as it can be borne; or they may be exposed to the vapour of laudanum, or of a vinous solution of belladonna, raised by mingling it in a cupful of hot water: warm bread and water poultices during the night are sometimes beneficial.

When the symptoms are moderate and the attack recent, evaporating or slightly stimulating lotions are frequently effectual in removing the complaint. The solution of a grain of the bichloride of mercury in $\frac{3}{4}$ viij of simple or rose water, is as useful a form as any: it should be employed tepid to bathe the eyes several times daily.

In severe attacks, when the acute inflammatory symptoms have been subdued by the treatment already pointed out, stimuli of considerable strength may be applied to the surface of the eye with decided benefit. The most useful are the gr. iv solution of the nitrate of silver, the red precipitate ointment, and the Vinum Opii. They have a marked effect in diminishing the irritability of the organ, in promoting the healing of ulcers of the cornea, and in dispersing the opacities which these may have occasioned. The red precipitate

ointment should be introduced between the lids at bedtime every night, or every second night; and any other stimulant which is selected ought to be regularly applied once a day, or every two days.

When large ulcers exist upon the cornea, a stronger solution of nitrate of silver than that mentioned above may be applied directly to their surface with a camel's hair brush, or the lunar caustic pencil filed to a sharp point may be employed. The latter is especially useful in deeply penetrating corneal ulcers, or when there is protrusion of the iris from the anterior chamber having been opened. The prolapsed portion may be touched with it every second or third day.

In deep central ulceration of the cornea, the extract of belladonna should be smeared over the eyebrow, or an ointment containing this substance rubbed into the temple and forehead: its effect in dilating the pupil is sometimes sufficient to free the iris, even when involved in an ulcer of the cornea. The eyes should be protected from the light by the use of a broad green shade, and guardians of children ought to be cautioned against binding up their eyes with handkerchiefs, a common and most pernicious practice. It is not necessary to confine the patient to a dark room, exposure to the air when the weather is fine being decidedly beneficial.

In cases of "vascular speck," the removal of a portion of the enlarged vessels which supply it, is one of the most effectual means of arresting its progress.

With regard to the treatment of the *pustular* form of strumous ophthalmia, a few words will suffice. The pustules or ulcers should be touched daily with solid caustic, or a strong solution of nitrate of silver, and the eyes bathed with the bichloride of mercury collyrium. After the exhibition of a few smart purges, it has been recommended to give chalybeates, as the sesquioxide of iron, in the dose of from gr. x to xx thrice daily: we have seldom found this necessary, the disease yielding readily to stimulating local applications.

(e) *Variolous Ophthalmia.*

The sympathy which is observed to exist between the skin and the mucous membranes in a state of health, is equally exhibited in their morbid conditions; and in no instance is it more strongly marked than in the exanthemata, in all of which the eye is apt to suffer, sometimes very severely. Previous to the introduction of vaccination, variolous inflammation of the conjunctiva was a frequent cause of serious injury to vision, or even of its complete destruction. The variolous pustules may be confined to the integuments of the palpebræ, or they may be developed on any part of the conjunctiva of the eye; constituting *true* variolous ophthalmia. When they occupy the former situation, and are numerous, as in the confluent form of the disease, they are attended with great swelling of the lids, by which the eyes are completely closed; while the augmented conjunctival and Meibomian secretions being confined by the incrustations which bind together the cilia, tend to increase the irritation of the organ and the patient's suffering. As the disease subsides these more immediate effects of the inflammation may pass away and the eye escape uninjured, though we more frequently find that both the eye and the lacrymal apparatus have materially suffered.

Among the changes of structure usually resulting from the formation of pustules upon the palpebræ, may be enumerated complete destruction or an abnormal position of the cilia, unsightly marks upon the tarsi, irregularity of their edges, or superficial ulcerations and excoriations with an irritable condition, which from slight causes is apt to pass into chronic ophthalmia of a very obstinate character. Chronic inflammation of the lacrymal sac, and strumous inflammation of the conjunctiva, are also frequent consequences of small-pox.

True variolous ophthalmia is characterised by the formation upon the conjunctiva of the pustules peculiar to this disease: they may be seated in any

part of the membrane, though the greatest danger is to be apprehended from their development upon the corneal layer. The disease is essentially the same on the cornea as on the skin, though in the former case its effects are serious and destructive, while in the latter they are comparatively insignificant. From the great tumefaction of the lids, it is frequently impossible to ascertain by inspection the actual condition of the eye; but if there is pain of the globe aggravated by motion or exposure to light, a feeling of dryness and stiffness of the eye with a sensation as of sand in it, and increased lacrymation and discharge, we may infer the existence of acute variolous inflammation, and consequently imminent danger to vision. If the above symptoms are absent, the disease is probably confined to the palpebræ. The pustules of the palpebral conjunctiva are small and of a yellowish colour. Upon the cornea they commence by small whitish points, which gradually become elevated and yellow. The suppuration extends to the substance of the cornea, and a pointed elevated pustule is formed, which is sometimes succeeded by onyx. The inflammation may extend to the deeper tissues of the eye.

Total or partial loss of sight will result from these disorganising processes. Suppuration or sloughing of the cornea is followed by a greater or less degree of opacity, which may or may not be attended with synechia anterior. Protrusion of the iris, or staphyloma, will follow penetrating ulcers, and in severe cases almost the whole of the cornea may be destroyed by purulent infiltration and ulceration.

Should the eyes escape during the early stages of variola, they are still liable to become the seat of a pustular eruption during the decline of the disease in other parts of the body: from this circumstance it has been named, "secondary variolous ophthalmia." The period of its attack varies from two to six weeks after the apparent termination of the primary complaint, with which it is identical in character; and though milder in degree, it is still not unattended with danger to vision. One or more pustules may form on the cornea, their development being accomplished in the manner already described, and accompanied with redness of the sclerotic coat, lacrymation, pain, and increased sensibility to light. This form of the disease seldom terminates in destruction of the cornea. The matter of the pustules is either entirely absorbed, leaving no trace of the disease; or ulceration takes place, and opacities varying in degree are the result. The injury to vision is often less serious than the aspect of the disease in its early stages would lead us to anticipate.

Treatment. When the eruption is limited to the integument of the eyelids, besides placing the patient in a moderate temperature and upon a cooling regimen, with the use of tepid ablutions, we may adopt some *local* measures to moderate the irritation occasioned by the pustules. The face should be covered with a soft cloth spread with some mild cerate, or fomented frequently with chamomile decoction, or tepid milk and water. When the pustules are matured their contents may be evacuated by pricking them, and the succeeding incrustation removed, after being well-softened with some unctuous application, or tepid wash. M. Serres recommends the pustules to be opened and thoroughly cauterised with the solid nitrate of silver. (*Traité de l'Ophthalmie, &c.* par J. Sichel, p. 460.)

In true variolous ophthalmia, when the pustules have extended to the conjunctiva of the lids and globe and to the cornea, active antiphlogistic measures seem alone to afford any chance of saving the organ, but unfortunately these are not always admissible. If the propriety of general bleeding is questionable, local depletion by leeches to the temples or behind the ears may be resorted to with advantage, and followed by a blister if necessary. Mercurial purgatives should also be freely administered. From the swollen condition of the palpebræ it is frequently impracticable to make any application to the inflamed conjunctiva; but the external surface may be bathed frequently with poppy

decoction, or tepid water, and the edges of the lids smeared with cold cream after removing the incrustations. As soon as the state of the parts will admit of it, a weak solution of nitrate of silver or diluted Vin. Opii should be injected between the lids.

In the treatment of the secondary form of the disease, the exhibition of tartar-emetic has been recommended as tending to abate the inflammation, and promote the absorption of the pustules and onyx. Leeches and blisters may also be required. When the acute inflammatory symptoms have been subdued, quinine may be given with advantage. Undiluted Vin. Opii should be applied once daily to the conjunctiva, and belladonna smeared over the eyebrow as a precautionary measure to keep the pupil dilated. M. Serres recommends the adoption of his mode of treatment for pustules seated upon the cornea, as well as for those upon the integuments of the lids.

(f) *Morbillous and Scarlatinous Ophthalmia.*

The ophthalmia which usually accompanies measles and scarlatina is neither so severe in its nature, nor so injurious in its consequences, as that attendant upon variola; bearing the same relation to the latter in degree which is observed to exist between the cutaneous inflammations in these several exanthemata.

The conjunctiva, participating in the morbid condition of the cutaneous circulation, exhibits some degree of redness accompanied with intolerance of light, slight pain, and increased lacrymal discharge. The cornea sometimes becomes the seat of phlyctenulæ, ulcers, or onyx, especially in scrofulous subjects, and indeed it is difficult to distinguish this form of inflammation from ordinary strumous ophthalmia till the eruption appears. In weakly children, or from the neglect of proper treatment, ulceration of the cornea and staphyloma have sometimes resulted from the ophthalmia attendant upon measles, and Mr. Lawrence has observed the same occurrence in that accompanying scarlatina. Opacities of the capsule of the lens, and affections of the iris, have been observed in some rare cases to ensue from scarlatinous ophthalmia.

Treatment. Active treatment is not required in these ophthalmiæ. The eyes should be frequently bathed with some cooling wash and protected from the light. The patient ought to be freely purged, and if the symptoms are unusually severe, a few leeches may be applied to the temples, followed by a blister behind the ear or to the neck. The nitrate of silver solution and the di-sulphate of quina will be found highly useful when the acute symptoms have yielded.

(g) *Erysipelatous Ophthalmia.*

Inflammation of the eyes from the extension of erysipelas of the face to the conjunctiva is frequently observed, but idiopathic erysipelatous inflammation of the conjunctiva, a form of ophthalmia described by some authors, is of rare occurrence. It is chiefly characterised by the elevation of the ocular conjunctiva in the form of vesicles round the cornea, which are of a soft consistence and yellowish red colour; the natural secretions of the part are augmented, and there is some degree of pain; the disease seems disposed to subside of itself, and does not demand any treatment beyond the puncture of the vesicles, and the exhibition of an aperient and diaphoretic. It is chiefly observed in individuals of cachectic habit, and may be caused by atmospherical changes, slight blows, and the stings of insects.

II. INFLAMMATION OF THE SCLEROTICA.

Rheumatic Ophthalmia, or, as it has been termed, *Sclerotitis atmospherica*, may be defined to be an inflammation of the sclerotica and surrounding fibrous tissues of the orbit: it rarely exists alone, being either accompanied from the

first, or speedily followed, by a degree of inflammation of the conjunctiva. The iris and cornea suffer to a certain extent, though, unless from neglect or mis-treatment, serious change of structure in either is not usually observed.

Symptoms. There is general bright redness of the globe of the eye, specially developed round the cornea, towards the margin of which the radiated sclerotic vessels may be observed advancing, and along with those derived from the conjunctiva, passing over it to the extent of about half a line, forming a fine vascular wreath, encircling the cornea either wholly or in part, and in which all the vessels are observed to terminate with sharp points, and at an equal height; none pass beyond it, the rest of the cornea remaining free. This arrangement and mode of termination of the vessels is considered by Jüngken to be characteristic of *Rheumatic Scleritis*. (*Lehre von den Augen Krankheiten*, p. 231.)

As the inflammation extends to the lining membrane of the aqueous chamber, the cornea becomes hazy; the iris loses its lustre, and sometimes changes in colour; its movements are sluggish, and the pupil is somewhat contracted, as may easily be ascertained when only one eye is affected, by comparing it with the other. Vision is of course impaired to a greater or less degree. Intolerance of light is always present, but varies in amount according to the severity of the other symptoms. The lacrymal secretion is considerable in quantity, and flows periodically from the eye. The pain felt in the globe of the eye is of a stinging, darting character, accompanied with a sensation of fulness and pressure. It extends also to the orbit and forehead, temple, cheek, and generally in the course of the branches of the fifth pair of nerves distributed to the face. The pain is much increased by warmth, and is sometimes of a pulsatory character, or consists chiefly in an agonizing, wearing-out sensation. It continues till the disease is subdued, varying however in degree, increasing in severity towards sunset, attaining its maximum about midnight, and abating towards morning: it entirely prevents sleep, and is a cause of so much distress to the patient, that he never fails particularly to mention it. Along with these symptoms fever is present to a greater or less degree.

Causes. This form of ophthalmia is more rarely met with in children and old persons, than in those of a robust constitution and of middle age, the same exciting causes probably originating at different periods of life different forms of ophthalmia. It may occur in those who have never suffered from rheumatism in other parts of the body, and under any circumstances is said to be always a primary affection, never metastatic. Both eyes are seldom simultaneously attacked; when it does happen, one is generally more seriously affected than the other. Those who have suffered once from this disease, are very liable to be again attacked.

Diagnosis. Besides the diversity of their seats, inflammation of the sclerotic coat is easily distinguished from the corresponding affection of the conjunctiva, by the following diagnostic marks:—The redness in inflammation of the sclerotica is deep-seated, and forms a radiated zone around, and upon the margin of, the cornea; in that of the conjunctiva it is superficial and reticulated, and frequently accompanied with subconjunctival patches of ecchymosis. The secretion from the eye in the former (*scleritis*) is lacrymal, in the latter it is mucous. The pain attendant upon sclerotica is generally severe, deep-seated, and frequently pulsative; it is especially felt over the orbit, and is aggravated from sunset to sunrise. In inflammation of the conjunctiva, the pain is comparatively slight; it is felt upon the surface of the conjunctiva, imparting a sensation as of sand beneath the eyelid; it seldom extends to the head, and is felt most in the morning when the eyes begin to be moved. In inflammation of the sclerotica there is always intolerance of light, varying in degree according to the severity of the other symptoms; in that of the conjunctiva, though slightly observed in the early stage of the disease, it disappears as the other symptoms become developed. The cornea, moreover, is dull and hazy in the former; in the latter it preserves its natural appearance. If the inflammation

has advanced to the iris, symptoms of iritis will be superadded to those already mentioned.

Treatment. Venesection is generally necessary in all cases of rheumatic ophthalmia. With a full strong pulse and a foul tongue, we may take fifteen or twenty ounces of blood, to be followed by the application of leeches in considerable numbers to the forehead or temple. The circumorbital pain is generally much relieved by the depletion; but should it still continue with a hard pulse, we must repeat the venesection; and this may be several times required before the symptoms entirely yield.

After clearing the bowels with a smart purgative, four grains of calomel and one of opium ought to be given every night, or they may be exhibited in smaller doses at intervals during the day. The effect of this combination in relieving the circumorbital pain is very marked; but as it is not given with a view to produce salivation, we are to be guided in its administration rather by the effect produced upon the disease, than upon the system. It is seldom, however, productive of decided benefit till the mouth is made slightly sore. Occasional laxatives should be administered, to obviate the constipating effects of the opium; but active purges are to be avoided, as tending to interfere with the due action of the mercurial.

The vinum colchici has been recommended, either alone or in combination with a purgative. If employed singly, it ought to be given in the dose of ʒj or ʒ iss every four or six hours till some decisive effect is observed. When thus exhibited, its effects must be closely watched.

Warm opiate frictions on the temple and forehead are useful in averting or relieving the nocturnal paroxysms of pain. Laudanum alone, or combined with the extract of belladonna, may be used for this purpose, and ought to be applied about an hour previous to the expected occurrence of the attack. Equal parts of laudanum and Tr. Cantharides form a good liniment in chronic cases. Blisters are frequently found beneficial.

The iris should be kept under the influence of belladonna during the whole course of the disease.

Applications to the eye in the form of collyria are of little service; those of a stimulating character are decidedly hurtful in the early stages. Tepid water may be recommended as at least harmless. The vinum opii, either pure or in a diluted state, will be found useful, after the acute inflammatory symptoms have been removed, and little more remains than a lingering redness and morbid irritability of the organ. At this period of the disease general tonic medicines are sometimes advisable, as small doses of the disulphate of quina, or of the mineral acids. Dr. Mackenzie recommends the arsenical solution in old mis-treated cases, in doses of from eight to twelve drops three times daily.

(a) *Catarrho-rheumatic Ophthalmia.*

To describe this disease merely as a complication of the former with a catarrhal affection of the conjunctiva, would not, in our opinion, be sufficient; its frequent occurrence and the serious organic changes which it often occasions in the structures of the eye, entitle it to a separate consideration.

Symptoms. We have the sandy pain and muco-purulent secretion, characteristic of conjunctival inflammation, co-existing with the circumorbital uneasiness, lacrymal discharge, and intolerance of light observed in sclerotitis. The latter affection is generally the more severe of the two.

Beneath the reticular arrangement of the conjunctival vessels may be observed the zonular disposition of those appertaining to the sclerotica, at least when not concealed by inflammatory œdema of the submucous cellular tissue, a not unfrequent accompaniment of the acute stage of the disease. The discharge from the inflamed organ is moderate in quantity, and from its compound nature is seldom opaque; imparting a moist appearance and slippery feeling

to the palpebræ, the edges of which are generally found adhering in the morning from incrustations of the Meibomian secretion, and their external surface is occasionally red and swollen. The photophobia and lacrymation, which are considerable throughout the course of the disease, become more marked when the inflammation has extended to the structure of the cornea.

Structural changes in the cornea in the form of ulceration, or deposition of pus in its substance, are what is most to be apprehended; and these are symptoms of such frequent occurrence, that if the disease has been allowed to run on unchecked during eight or ten days, we may expect to meet with one or both of these consequences, especially in patients of advanced years. The ulceration is peculiar in this respect, that it tends to spread over the surface of the cornea, rather than to penetrate deeply into its substance. The ulcer is generally of an irregular figure, with a transparent and uneven surface, somewhat resembling an abrasion of the conjunctival covering of the cornea, or as if a portion of its substance had been hacked off with a cutting instrument. The deposition of pus in the substance of the cornea, constituting what is termed *onyx*, is a symptom still more alarming with reference to the eventual preservation of vision. It is usually observed first at the lower edge of the cornea, from whence, gradually extending upwards, it may involve half the diameter of that membrane. The pus thus deposited is rarely absorbed, being generally evacuated externally through an ulcer which forms over its centre.

Very frequently the ulcerative process extends inwards through the posterior layers of the cornea, giving vent to the aqueous humour and producing prolapse of the iris, which terminates in general or partial staphyloma.

Hypopion, or the deposition of pus in the anterior aqueous chamber, is sometimes observed to accompany the formation of *onyx*; or it may result from the contents of the *onyx* being primarily discharged into this cavity through the posterior wall of the cornea, this membrane ultimately giving way through its entire thickness. While these changes of structure are proceeding in the cornea, the iris becomes altered in colour, and sluggish in its movements; lymph is effused into the pupil, which is now observed to be hazy and contracted, and at last may be entirely closed.

Febrile symptoms indicate the sympathetic affection of the constitution.

Sleep is prevented by the nocturnal accession of pain, and the patient's sufferings are frequently aggravated by the co-existence of catarrhal affections of other portions of the mucous membrane.

Beer attributed rheumatic ophthalmia to the effects of currents of cold air, while he supposed the catarrhal form of the disease to originate from a similar impression of a foul atmosphere. The disease in question may possibly arise from the *co-existence* of these causes, a combination often to be met with in the damp and ill-ventilated dwellings of the poor. The subjects of it are generally persons advanced beyond the meridian of life; it is more rarely observed in the middle-aged or young, and we have never seen it in children.

Treatment. As we have here the co-existence of two distinct diseases, our treatment must be equally of a twofold nature, being directed both against the sclerotic and conjunctival part of the affection.

With regard to the former, those means must be employed which have been already recommended under the head of rheumatic ophthalmia.

The accompanying conjunctivitis is to be treated by the usual local applications, mentioned under the head of that disease, although it will be prudent to postpone their employment till the acute symptoms of the sclerotic affection have yielded; the gr. iv solution of the nitrate of silver may be dropped into the eye several times daily, or the Vin. Opii either pure or diluted. The red precipitate ointment should be smeared upon the edges of the palpebræ at bed-time, and a solution of gr. j of the Hydrarg. Bichlor. in $\frac{3}{4}$ viij of water used tepid, as a collyrium, three or four times a day.

The rheumatic symptoms are generally the first to yield, the catarrhal per-

sisting for some days longer ; in other instances, the circumorbital pain continues to linger, after the conjunctivitis has disappeared.

Dr. Mackenzie dissuades from any attempt being made to evacuate the contents of an onyx by incising the cornea ; stating, that in every case in which he has adopted this measure, partial or total staphyloma has resulted. (*Practical Treatise*, p. 488.)

III. INFLAMMATION OF THE CORNEA.

Inflammation of the cornea, attacking different portions of its tissues, has been already described, as occurring in several of the ophthalmiæ. The disease which we are about to consider is, at its origin, apparently seated in the parenchyma of the cornea, although it gradually spreads to its other tissues, and sometimes even extends throughout the various textures of the eyeball. Occurring generally in individuals of a strumous habit, it partakes of the chronic character of scrofulous diseases, and seems therefore entitled to the distinctive appellation of *Strumous Corneitis*.

Symptoms. The usual subjects of its attacks are individuals between the ages of eight and eighteen years. It generally commences slowly and insidiously, the cornea loses its natural brilliancy, and becomes dull and hazy, its surface appearing as if covered with fine dust, or resembling glass which has been breathed upon. In a more advanced stage, attended with increased opacity, the cornea frequently appears covered with minute depressions, such as might be produced by dotting its surface with the point of a pin ; sometimes they are of greater depth, resembling under a magnifying lens numerous small ulcers aggregated together. The fine vessels of the conjunctiva and sclerótica become injected with red blood ; those of the latter membrane, which is the principal seat of increased vascular action, are arranged in radii round the cornea, and present a carmine hue. The edge of the cornea is sometimes partially encircled by a ring of minute vessels, of a brownish red colour ; occasionally they are arranged in patches slightly elevated, with a regularly defined margin, and bearing a close resemblance to spots of ecchymosis. Examined with a strong magnifying power, they are seen to be composed of numerous small vessels, which are straight and parallel with each other. Single vessels are observed to pass over the corneal epidermis and ramify upon it ; sometimes they are so numerous as to form a vascular network covering the entire surface, and giving rise to the appearance which has been named "Pannus."

Besides the general haze of the cornea, there is a marked tendency to the deposition in its substance of an opaque white matter, which is sometimes confined to circumscribed spots, with intervening transparent portions, giving the cornea a mottled appearance. These spots occasionally assume a yellowish hue, as if pus had been deposited ; but they rarely ulcerate, and deep ulceration is scarcely ever seen. In other instances the deposition is more general ; commencing at the centre it spreads towards the circumference, producing dense opacity of the whole surface, of a uniform dirty white colour. At this stage of the disease, the cornea, when examined laterally, is seen to be increased in volume, and its texture appears as if softened.

Inflammation of the cornea, when of some standing, is usually accompanied with an increased secretion of the aqueous humour, producing a change of figure in the cornea, which becomes more convex than natural. Sometimes the whole globe assumes a somewhat conical form, the thinning of the sclerótica anteriorly permitting it to give way beneath the pressure of the recti muscles ; thus constituting, to a certain extent, staphyloma of the corpus ciliare.

Dilatation of the pupil with some degree of amaurosis has been observed. In other cases, the inflammation has spread to the iris, producing contraction of the pupil, and adhesion to the capsule of the lens. From the opaque con-

dition of the cornea, it is frequently very difficult to ascertain the precise state of the internal structures. Much assistance may be derived in such circumstances from dilating the pupil with belladonna, and concentrating the light upon it by means of a large double convex lens.

The intolerance of light is generally moderate in degree; though in some instances it is very great, and accompanied with lachrymation. Considerable pain with a sense of pressure or tension in the eye, and pain in the forehead, are frequent symptoms in the early stages. The pain is sometimes acute, coming on in paroxysms; but in the chronic state it is slight, especially after the whole cornea has become opaque.

The *prognosis* is rather unfavourable, although from the early age of the patients who are usually the subjects of this affection, surprising recoveries certainly take place.

Treatment. Judging from the apparent chronic character of the inflammation and the trivial amount of pain usually attending it, we might suppose that depletion was seldom indicated; the local abstraction of blood, however, is productive of the best effects in the early stage of the disease. If there be severe pain in the eye and forehead, the propriety of antiphlogistic measures is sufficiently obvious; it may even be necessary to bleed from the arm. The local depletion ought to be repeated occasionally, care being taken not to reduce too much the strength of the patient.

Purgatives and emetics should be employed as recommended under the head of *Strumous Ophthalmia*.

The exhibition of small doses of the potassio-tartrate of antimony, in combination with the disulphate of quina, is highly beneficial, and more effective than either given singly. In cases of moderate severity, the disulphate of quina alone exercises an equally marked, though less speedily developed control, over this disease as it does over scrofulous inflammation of the conjunctiva. In cases accompanied with much general debility, it may be prescribed from the first.

When the symptoms of active inflammation are urgent, and opacity of the cornea is rapidly progressing, these remedies alone cannot be relied upon. Having checked the severity of the inflammatory symptoms, we must have recourse at once to the exhibition of calomel and opium, so as to affect the mouth; the beneficial operation is evidenced by the contraction of the dilated corneal vessels, and the gradual absorption of the opaque deposit, the process of clearing beginning at the circumference, and advancing towards the centre. The use of mercury from the first is especially required when the iris participates in the inflammation. Counter-irritation ought not to be neglected, as it is frequently productive of great benefit.

The pain and intolerance of light may be alleviated by the use of warm anodyne fomentations. Stimulating applications to the eye ought on no account to be employed till the acute symptoms have been subdued. When had recourse to, the stimulant ought to be frequently varied; the pupil should be kept under the influence of belladonna, not only when there are evident symptoms of iritis present, but also when its existence is merely suspected. The treatment adopted must be persevered in for a considerable length of time, even although no good effects are immediately observed.

The progress of recovery will be much accelerated by the beneficial influence of pure air and moderate exercise.

Evacuation of the aqueous humour by puncturing the cornea has been proposed as a means of relieving the sense of distension occasioned by the increased secretion of that fluid. The practice is highly recommended by Jüngken of Berlin and other continental oculists, also by Mr. Wardrop in this country, who has employed it frequently with advantage in different inflammatory affections of the globe. (*Med. Chir. Trans.*, vol. iv.) Mr. Lawrence, on the other hand, speaks less favourably of the operation.

IV. INFLAMMATION OF THE IRIS.

We have already had occasion to notice this disease as occurring in the course of several of the ophthalmiæ which have their primary seat in the external tunics of the eyeball. We shall now consider it both as an idiopathic affection, and as it occurs sympathetically, in certain peculiar conditions of the system.

Iritis, from whatever cause it originates, is recognised by certain general indications, some of which it exhibits in common with other ophthalmiæ, and some are peculiar to itself. Among the former may be enumerated: 1. Zonular redness of the sclerotica, composed of numerous vessels surrounding the cornea, and running in parallel radii towards its edge: 2. Adhesions of the iris, and chiefly of its pupillary margin, to the capsule of the lens, and in some rare cases to the posterior surface of the cornea: 3. Effusion of coagulable lymph into the anterior or posterior chambers, and sometimes into both: 4. Imperfection of vision, varying in degree from mere dimness to total blindness: 5. Pain in the eye, and nocturnal circumorbital pain.

Among the latter, or those which may be considered as peculiarly characteristic of iritis, are—1. Loss of brilliancy and change of colour in the iris, from its natural hue to that which might be produced by mingling the colour of the red vessels or the effused lymph with its original tint; thus, a light-coloured iris becomes greenish or yellowish, the blue is converted into a green, or, if dark-coloured, it presents a reddish tinge: 2. Structural change in the iris, manifested by the obliteration of its naturally fibrous texture, and the formation of tubercles or abscesses in its substance: 3. Contraction and immobility of the pupil. The co-existence of these *three* last-mentioned symptoms is pathognomonic of inflammation of the *substance* of the iris only, the *first* and *third* being equally characteristic of inflammation confined to the serous covering of that membrane.

All of the symptoms above-mentioned, in either division, are not invariably present in every single case of iritis: thus, there may be total absence of pain whether in the eye or head, no effusion of lymph, nor any abnormal adhesions, or morbid deposition in the substance of the iris. In some cases complicated with amaurosis, the pupil, instead of being contracted, is dilated; still these are the exceptions: in general, a sufficient number of symptoms is present, to enable us to determine with precision the nature of the disease. As inflammation of the iris may occur in two apparently different structures of the same membrane, viz. the serous covering and the parenchyma or proper substance, it is hence distinguished into “iritis serosa,” and “parenchymatosa;” the former is most frequently observed as attendant upon strumous ophthalmia, the latter in cases of venereal origin.

Iritis may present itself either in an acute or chronic form, to which some authors have added a third, or sub-acute degree. We shall first describe in detail the usual symptoms and effects of acute idiopathic iritis, leaving for after consideration the modifications which it may undergo in degree, and the peculiarities which distinguish it when occurring sympathetically.

(a) *Acute Idiopathic Iritis.*

Symptoms. A vascular, radiated band is formed round the circumference of the cornea, consisting of hair-like, parallel, straight vessels, which terminate abruptly at the edge of this membrane, appearing to sink through the sclerotica as they pass to the iris. The redness is at first confined to the immediate neighbourhood of the cornea, the circumference of the globe being comparatively clear; but as the disease advances, the increased action extends to the vessels of the conjunctiva, the whole surface of the eye assuming a fiery redness which often masks for a time the zonular sclerotic injection. The radiated zone continues, however, so long as the disease lasts, varying in in-

tensity and completeness according to the degree and extent to which the iris is inflamed.

The naturally brilliant surface of the iris becomes dull and muddy in appearance, and the beautiful fibrous arrangement of its internal structure is rendered indistinct, or is destroyed; while from the increased vascularity of the membrane or the effusion of lymph, its original hue is exchanged for one of a darker shade. These changes commencing in, and in some instances for a time confined to, the edge of the pupil, gradually extend outwards to the ciliary margin of the iris.

The effusion of coagulable lymph may take place upon either surface of the iris, or into its substance. It may form a thin layer of variable extent upon its anterior surface, producing discolouration, slight irregularity, and a villous appearance of the part; this form of deposit, though generally confined to the *smaller* circle of the iris, is attended with dimness and change of colour of the annulus major.

The lymph is sometimes deposited in masses of a reddish yellow colour, varying both in size and number, and seated at the edge of the pupil, or upon any part of the anterior surface of the iris. Sometimes it is so profuse in quantity as to fill the anterior chamber.

Suppuration and true abscess of the iris may occur. The membrane appears to swell, and bulges forward towards the cornea, becoming puckered and irregular; one or more minute yellowish points appear upon its surface, indicating the seat of the abscess, which bursts, and pours its contents into the anterior chamber, forming hypopion. The shreds of the cyst are often visible for some days hanging from the surface of the iris. Hypopion may also occur from direct effusion of lymph, sometimes mingled with blood, into the anterior chamber. Effusion of lymph may also take place upon the posterior surface of the iris or uvea, and upon the margin of the pupil, in the former case uniting the iris to the anterior capsule of the lens, in the latter obscuring the natural transparency of the pupil by the intervention of a thin film of lymph, or even completely blocking it up with an opaque mass.

Lymph may be effused in such quantity into the posterior chamber as to make its way through the pupil, or produce tumour of the sclerotica, or even pass through that coat and protrude beneath the conjunctiva. From the yellowish appearance of the tumour thus occasioned, such cases have been mistaken for examples of general suppuration of the globe; a consequence which Mr. Lawrence remarks he has never observed to result from iritis in any form. (*Op. cit.* p. 287.)

Effusion into the substance of the iris, with discolouration of this membrane and thickening of the pupillary margin, are generally the first changes observed, and usually occur together; but in very violent cases, effusion of lymph may take place simultaneously in each of the situations indicated. The movements of the iris, which at first are rendered sluggish and limited by the interstitial effusion, become at last wholly suspended; an effect which is further promoted by the existence of abnormal adhesions. The pupil is observed to contract as the disease advances, to become dull, cloudy, and irregular, and sometimes altered in situation from the causes just mentioned. Its edge is thickened and retracted towards the capsule of the lens, and presents a villous or spongy appearance. As many morbid phenomena tend to prove the existence of an intimate vascular connexion between the sclerotica, cornea, and iris, we are not surprised to find haziness of the cornea, which is at first general and slight; but if the inflammation is severe, or of long continuance, circumscribed opacities of greater density may be formed.

Pain is rather a variable symptom: sometimes it is of a burning tensive character, felt deep in the globe and over the orbit, extending also to the bones of the temple and cheek; it is aggravated during the night, and totally prevents sleep. In other instances it is slight, or entirely absent, even in cases attended with extensive disorganisation. Dimness of sight is an early consequence of

iritis, and may be gradually increased, until a mere perception of light and shadow remains.

In very acute cases there is a considerable degree of fever present, which however is variable. If not checked, the inflammation gradually spreads from the pupillary margin of the iris to its external border, and from thence to the corpus ciliare, and the deeper-seated structures of the choroid and retina, attended with great increase of the local suffering, and marked by the sensation of flashes of light, and the gradual extinction of the power of vision. The inflammatory action also extends to the cornea and other external tunics, until at last it may involve every tissue of the eyeball.

The structural changes most frequently observed are the following: the iris presenting a dull leaden hue, and completely altered in structure, bulges forward in the form of a convex protuberance with a puckered surface, the result either of thickening of its texture or the pressure of an increased secretion behind it. The cornea is either clear, or opaque in various degrees, and vision is irrecoverably lost, as inflammation capable of effecting such alterations of structure generally extends to the retina. The pupillary margin of the iris may be attached by various points of its circumference to the capsule of the lens by means of slender threads of lymph, which however admit of some degree of motion. Alteration of the pupil in figure does not interfere with perfect vision; and even its reduction in size to a mere pin-hole is not productive of any material inconvenience provided it is clear. In some instances, the pupil is entirely closed, and the iris adherent to an opaque mass of lymph which has been effused behind it, producing the condition termed "*atresia iridis perfecta*," in which case vision is lost. In other instances we find the pupil still open and only partially occupied by the effused lymph, which may be situated either in the centre of the aperture, leaving the iris free, or on one side with the iris adhering to it, and producing displacement of the pupil from its natural position. This has been termed "*atresia iridis imperfecta*:" vision is impaired to a greater or less degree, but is often susceptible of improvement by the use of belladonna to dilate the pupil. If lymph has been effused to such an extent as to cause tumours of the sclerotica, although it may be absorbed as the inflammation declines, the internal structures have generally suffered so much injury that the globe becomes flaccid and atrophic.

For some time after the disease has ceased, and especially if the attack has been severe and protracted from mismanagement, the eye continues weak, morbidly sensitive to external influences, and prone to relapse from slight exciting causes.

Iritis may present itself in a *chronic* form, arising imperceptibly and attended with so little pain and redness, as not to attract the patient's attention, and yet proceeding by the effusion of lymph to the gradual diminution, or even total destruction of vision. If confined to one eye the injury may only be discovered accidentally, by the patient closing the sound one. Between this very obscure form of the disease, and the severe and well-marked affection which we have already described, various degrees may be observed, varying in the prominence of their symptoms, the amount of injury which they inflict, and the facility with which they yield to treatment.

Causes. Among these may be enumerated direct injuries to the eye, whether occurring accidentally or inflicted during the performance of surgical operations, as in the extraction of cataract, or the formation of artificial pupil. Over-exertion of the eyes, or atmospherical influences, are sufficient to give rise to this disease in some individuals, especially in those of strumous habit, or who exhibit that unhealthy condition of the system observed in gout, rheumatism, and secondary syphilitic affections. The occurrence of iritis has been ascribed by some writers, either wholly or in part, to the use of mercury. That its undue employment may predispose an individual to iritis, as well as to inflammatory affections of other textures, may be admitted; while we are far from thinking that there is sufficient evidence to establish the relation of cause

and effect between the judicious use of this medicine and the disease in question. Mr. Lawrence (*Treatise on the Venereal Diseases of the Eye*, p. 165.) remarks that he has seen no instance of iritis of any kind, in which there appeared to him reason for ascribing the complaint to this cause. A similar testimony is given by Mr. Rose, Dr. John Thomson, and Dr. Eckström of Stockholm, as quoted by Mr. Lawrence.

Diagnosis. The rheumatic and catarrho-rheumatic forms of ophthalmia and iritis may be confounded with each other; and indeed the former diseases are seldom observed to exist without the latter being present in some degree. The mistake would not however be of much importance at first as regards treatment, similar and equally active measures being required in the same form of each of these affections. From corneitis, with which it has several symptoms in common, it may be distinguished by the opacity of the cornea, which exists to a much greater degree in the former affection than is ever observed in iritis, presenting a peculiar mottled and striated appearance, with red vessels occasionally ramifying upon its surface. The state of the iris and pupil, when it can be ascertained, will frequently assist us in deciding upon the individual or combined existence of these diseases. If the pupil is of the natural size, and the motions of the iris free, the case is one of simple corneitis; if on the other hand, the pupil is contracted and fixed, iritis is undoubtedly present.

Retinitis exhibits the same appearance of external inflammation and gradual closure of the pupil observed in iritis, but is more sudden in its attack, and runs its course with greater rapidity; the local suffering is more intense, and vision in every degree is extinguished at an earlier period of the disease.

Recovery may be considered hopeless, when along with change of colour in the whole iris, and a contracted and opaque pupil, there is great external vascularity, severe, deep-seated pain, and total insensibility to light.

Treatment. To subdue the inflammatory action, to arrest the effusion of lymph and promote the absorption of what has been already deposited, and to preserve the natural condition of the pupil, are the three principal indications to be fulfilled in the treatment of this disease. We must seek to accomplish them by the employment of antiphlogistic measures, mercury, and belladonna.

General and local depletion must be at once resorted to, and pursued with vigour, when there is reason to apprehend an extension of the inflammation from the iris to the deeper tissues of the eye. The bloodletting should be repeated till the disease gives way. The bowels must be freely moved by mercurial purgatives followed by saline aperients, the potassio-tartrate of antimony in nauseating doses, low diet, and rest, not merely of the inflamed organ, but of the *whole body*—a circumstance of much importance in the treatment of the internal ophthalmia.

In cases of less severity, the local abstraction of blood by leeches and cupping will probably suffice; although venesection is often to be recommended, even when the disease does not present a very acute character. Having thus arrested the inflammatory action, we must proceed at once to the exhibition of mercury; without which we shall rarely succeed in checking, and still less in removing those alterations of structure, which result from the deposition of lymph in the pupil and texture of the iris. The best form, generally speaking, is that of calomel with opium, in the proportion of from gr. ij to gr. iv of the former, with from gr. $\frac{1}{4}$ to gr. $\frac{1}{2}$ or more, of the latter, every eight, six, or four hours, as the case may require.

With regard to the extent to which the employment of mercury should be carried, it is in general sufficient to affect the mouth. In some cases full salivation rapidly produced, acts like a charm in carrying off the disease; the medicine may then be intermitted and its effects allowed to subside. In cases of a chronic character, it is generally necessary to keep up a moderate degree of mercurial action for some time; this is more frequently required in

relapses, and cases where the patient has been previously affected, than in first attacks. The question has been frequently discussed, whether iritis can be cured without mercury, and variously replied to: we have no hesitation in saying that it can; but it is much more likely in such circumstances to prove injurious to vision, from the persistence of those structural changes which this medicine only is adequate to remove.

As regards the sufficiency of mercury when employed alone, to effect the cure of iritis, it is no doubt possible, and the disease has frequently been thus treated; but generally speaking, the practice is not to be recommended, and the exhibition of mercury unpreceded or accompanied by depletion has unquestionably been productive of serious injury to the affected organ. Mr. Lawrence states, that "iritis generally, and the syphilitic form of the complaint particularly, will be most advantageously treated by the successive or combined employment of antiphlogistic means and mercury; that this plan will give the quickest relief, will most effectually arrest the inflammation, restoring the iris to its healthy structure and functions, and will afford the best security against the return of the disease." (*Op. cit.*, p. 307.) The exhibition of mercury will often prove beneficial even after every symptom of active inflammation has passed away, and those effects alone remain, which we might suppose to be permanent; in such circumstances, its action ought to be slowly excited, and maintained during several weeks. Mercury has also been employed locally, to relieve the circumorbital pain, which is frequently productive of so much suffering. For this purpose, from gr. viij to gr. x of the Ung. Hydr. Fort. combined with gr. ij or more of powdered opium, ought to be well rubbed into the temple or forehead at night, previous to the occurrence of the paroxysm.

To prevent the contraction of the pupil, the extract of belladonna should be smeared over the eyebrow, once in the twenty-four hours. The employment of belladonna in this manner, during the acute stage of iritis, has been objected to, from its occasional effect in tearing asunder the adhesions between the iris and capsule of the lens, leaving portions of the uvea permanently fixed upon the capsule. Although it cannot be denied that this does sometimes happen, it will be of rare occurrence if suitable depletory measures have been premised. When the acute inflammatory symptoms are removed, a filtered aqueous solution dropped upon the conjunctiva may be substituted for the extract applied to the skin. The continued use of this remedy in one or other form, even for months, is frequently advantageous, producing gradual dilatation of the contracted pupil, and elongation of the filaments of lymph which bind the iris to the capsule of the lens.

Counter-irritation by blisters, though not admissible in the acute stage of the disease, is of essential service at a later period. Local applications in the form of collyria are unnecessary; those of a tepid soothing nature are productive of little benefit, and stimulating washes are decidedly injurious while any acute symptoms remain. Mr. Carmichael of Dublin has recommended oil of turpentine as a remedy in iritis; he was led to employ it from the observation of its good effects in peritonitis, in which a membrane, presenting some analogies both in its healthy and morbid conditions to the iris, is the seat of inflammation. It is not proposed as a general substitute for mercury, but as an active and effectual remedy, applicable in circumstances in which from idiosyncrasy, debility, or other causes, the former is inadmissible. He employs the following formula: — R. Ol. Terebinth. Rectif. ʒ j; Vitell. Unius Ovi; tere simul, et adde gradatim Mist. Amygd. ʒ iv; Syrupi Aurantii ʒ ij; Tr. Lavand. Comp. ʒ iv; Ol. Cinnamomi gtt. iij vel iv. Misc. Sumat coch. magna ij ter de die. Mr. Guthrie reports favourably of its effects in some instances, while in others it was either of little service, or completely failed. Mr. Lawrence has had no experience of it; and although we have not given it a fair trial, we should advise its employment in cases in which the use of mercury is contra-indicated.

(b) *Syphilitic Iritis.*

The iritis which occurs in a constitution infected with the venereal poison, is a sympathetic affection, which closely resembles the idiopathic form in its leading features, and yet differs from it in presenting some peculiarities. It is the most frequent form of iritis, and a secondary symptom of the venereal infection as distinctly marked as any other. It sometimes occurs alone, but more frequently presents itself in combination with other morbid evidences of the constitutional taint; and like other members of the family of early secondary symptoms, may appear before the *primary* disorder is cured. Conformably to the cause of syphilitic affections in general, it is slow and insidious in its early stages, but as it is developed, may prove rapidly and extensively destructive. It is rarely observed as a symptom of syphilis in infants. Mr. Lawrence, whose experience in this disease has been very great, says, that only two instances of the kind have come under his observation. (*Op. cit.*, p. 317.)

Syphilitic iritis may occur either in an acute or chronic form, and is distinguished in these different degrees by the general symptoms already enumerated. Two circumstances have been mentioned, as peculiarly characteristic of the syphilitic form of the affection,—viz. displacement of the pupil, upwards and inwards, towards the root of the nose; and the effusion of lymph in masses, or in the form of tubercles, upon the surface of the iris. With regard to the first phenomenon, its occurrence appears to be accidental, and may be referred to the peculiar position of the adhesions between the pupillary margin of the iris and the capsule of the lens. Dr. Mackenzie attributes it to an affection of the ciliary or iridal nerves, and states that he has observed it to occur in chronic rheumatic iritis, and still more frequently in choroiditis, unattended by inflammation of the iris. (*Op. cit.*, p. 513.) Tubercles upon the iris are certainly rarely to be met with, except in syphilitic cases; they are of a reddish brown colour, with an irregular surface, and may grow from any part of the membrane, sometimes attaining such a size as to compress it and fill the anterior chamber. They ultimately suppurate, pouring their contents into this cavity; and from the pupillary margin being generally adherent in such circumstances to the anterior capsule of the lens, the gradual contraction of the remaining cyst may detach the iris from the ciliary ligament, or cause laceration or absorption of its fibres, thus producing a permanent false pupil. In addition to the above circumstances, a cinnamon colour of the sclerotic zone, minute brown spots upon the cornea, and nocturnal circum-orbital pain, have been mentioned as diagnostic distinctions of syphilitic iritis; they are certainly corroborating evidences when taken in conjunction with other symptoms, but are not peculiar to this form of inflammation.

Diagnosis. There is no single symptom which can be relied upon as pathognomonic of syphilitic iritis; but in the generality of cases its existence may be clearly inferred from the combination of several, taken in connexion with the previous occurrence or actual presence of syphilitic affections in other parts of the body. Mr. Lawrence observes, “although the effusion of reddish, brownish, or brownish-yellow lymph on the iris in the adult, clearly shows the case to be venereal, I have seen analogous appearances in several instances both of young children and infants, in whom no suspicion of syphilis could be entertained. (*Op. cit.*, p. 319.)

The *treatment* already recommended under the head of *Idiopathic Iritis* is equally applicable to the syphilitic variety.

(c) *Rheumatic Iritis.*

Judging from the descriptions which have been given of this disease, and we especially refer to that of Dr. Mackenzie (*op. cit.*, p. 505. *et seq.*), we are unable to discover wherein it essentially differs from idiopathic iritis. It is apparently the same in its symptoms, mode of progress and effects; is produced by many similar causes, and yields to the same mode of treatment. The

distinction which might be drawn from the circumstance of its occurrence with an unsound condition of the system, is one which does not always hold good, as it may occur in individuals who have never exhibited any other evidence of their possessing a rheumatic diathesis. Like rheumatic affections in general, this form of iritis is said to be frequently excited by atmospherical changes, and is very apt to renew its attack; it has not been observed to be metastatic.

The modifications of *treatment* which have been recommended apply chiefly to the minor details, and do not at all affect the general principles already laid down. The disulphate of quina is frequently beneficial, but ought by no means to be relied upon singly, and still less ought it to supersede the exhibition of calomel and opium, in the circumstances and manner already noticed under the head of idiopathic iritis. The patient ought to be especially careful against exposing himself to sudden alterations of temperature. Dry warmth, applied to the eye by means of compresses of old linen heated at the fire, is frequently productive of benefit, and tepid fomentations with some narcotic decoction, as poppyheads, belladonna, or tobacco, may be employed; the parts being afterwards carefully dried and the heated compress replaced. Counter-irritation is especially useful; this may be effected in a minor degree, by adding an equal quantity of the Tinct. Lyttæ to the laudanum with which the temples are rubbed. Vin. Opii dropped into the eyes is useful in the decline of the disease.

(d) *Arthritic Iritis.*

The arthritic inflammation of the Germans, whether identical or not with the gouty inflammation, properly so called, as observed in this country, does not manifest itself exclusively in the first or plethoric period of gout, when the patient's digestive powers continue unimpaired; but occurs equally, and perhaps more frequently, "in the second or asthenic period of the disease, when repeated attacks have produced debility and dyspepsia." (Mackenzie, *op. cit.*, p. 527.) Although the disease we are about to describe originates in and is limited to the iris, it is also developed in the sequel of a more extended and destructive inflammatory condition of the internal textures of the eyeball, apparently of a gouty character.*

Arthritic iritis generally presents itself in an acute form, and exhibits the usual objective symptoms of inflammation of that membrane; distinguished, however, by several peculiarities: thus, the sclerotic redness is of a purplish hue, and the vessels composing it stop short within a line or so of the margin of the cornea, the intervening space being occupied by a narrow ring of a bluish white colour, which is sometimes incomplete, being developed only towards the angles of the eye. The sclerotica itself presents a dirty greyish violet colour while the visible bloodvessels passing across it from the recti muscles are frequently varicose. The palpebræ are red and slightly swollen, and small masses of a whitish foam are observed to collect upon their edges and at the inner canthus. As the disease advances, the iris begins to exhibit symptoms of change of structure, becoming dull and discoloured: the pupil retains its natural position, but is contracted, and the iris is united by one or more points of adhesion to the capsule of the lens; there is considerable intolerance of light and lacrymation. The pain, which is sometimes the earliest symptom, is at first of a peculiar tingling character, felt in the neighbourhood of the eye and upon the integuments of the face; but extending by degrees to the eye and orbit, the side of the head, and the jaw, it becomes proportionally increased in severity. The pain is frequently periodical in its attacks, but is always aggravated during the night; the constitutional symptoms are of a febrile character and vision is considerably impaired. After having

* This general morbid condition Beer includes under the head of "Arthritic Iritis;" while Mr. Lawrence, more correctly in our opinion, describes it under the title of "Arthritic Inflammation of the internal Tunics," of which the iritic affection is only one of many consequences.

continued for some time, the disease may gradually decline, the symptoms wholly disappear, and vision be completely restored, although the iris remains united by whitish adhesions to the capsule of the lens. The inflammation is very prone to return, and such relapses may occur frequently without occasioning any serious injury to the organ. But as effusion of lymph takes place during each attack, the pupil in general is gradually contracted, and at last entirely filled with an opaque adventitious membrane, sight being wholly lost, although the texture of the iris may have undergone but slight alteration. The pupil is sometimes closed by one severe attack, or contracted and filled with a densely opaque mass. Arthritic inflammation, when severe and long-continued, may produce complete disorganisation, with puckering and tubercular projection of the iris, and extinction of sight.

Causes. The disease in question appears to arise spontaneously, without any assignable cause besides that which exists in the state of the constitution, and perhaps in the condition of the digestive organs. In such circumstances, the ordinary ophthalmiæ are apt to degenerate into this form.

Treatment. We shall notice the treatment only in so far as it differs from that recommended under the head of *Idiopathic Iritis*. However objected to by some writers, apparently on speculative grounds, we need not hesitate to deplete, both generally and locally, in robust and plethoric individuals; and even in older persons, whose strength has been reduced by previous gouty attacks, the abstraction of blood is apparently equally necessary, when active local disease is combined with much febrile action. After depletion and the exhibition of mercurial purgatives, the Tr. of Colchicum may be given with advantage, either alone or combined with a purgative. Although the employment of mercury, to the extent of producing salivation, is neither necessary nor beneficial, an alterative course may be prescribed with much advantage, and continued in some cases during weeks or months. The sesquioxide of iron has been given with benefit in some cases, in which depletion and mercury had been employed without advantage. The disulphate of quina, in combination with Fowler's solution, is also worthy of a trial.

Abstinence from stimulating articles of food and drink ought to be enjoined. Counter-irritation is of great service after the urgent inflammatory symptoms have been subdued. Tepid anodyne fomentations, or preferably, dry warmth as recommended in the preceding section, are the best local applications. Friction with opiates upon the temple and forehead will moderate the severity of the periodical attacks of pain, and ought to be employed every evening previous to the time of their expected recurrence. To correct the relaxed and weakened condition of the bloodvessels of the eye, and remove the preternatural sensibility which generally remains after the acute inflammatory symptoms have disappeared, we may employ some local tonic. The Germans recommend for this purpose wearing over the eye small linen bags filled with dried aromatic plants: probably the gentle stimulus communicated by the exhalation of their volatile particles may be of service. Friction round the orbit with some stimulating fluid has been employed beneficially with the same design, and even stimulating applications to the conjunctival surface itself. But of one and all of these local remedies it may be remarked, that we must be cautious in having recourse to them, while any inflammatory symptom continues to linger in the affected organ.

(e) *Strumous Iritis.*

Strumous iritis is sometimes observed to exist as a primary affection, but much more frequently occurs in consequence of the extension of this kind of inflammation from the external tunics to the deeper textures of the eyeball. Occurring generally in a chronic form, with mild symptoms, and being preceded and accompanied by structural changes in the cornea which obscure our view of the internal parts, its existence may be entirely unsuspected.

After continuing for a length of time without making much progress, it may ultimately extend and produce disorganisation of the neighbouring tissues, terminating in amaurosis and atrophy of the globe. Iritis occurring in very young persons may always be suspected as of this character, from the comparative rarity of its other forms at this period of life. Like strumous inflammation of the external tunics, it is an obstinate affection, and less amenable to treatment than the other species of iritis.

The *treatment*, with the exception of certain modifications suited to the peculiar nature and seat of the disease, as the omission of local stimuli, and the application of belladonna to the eye-brow, does not differ in any essential particular from that recommended under the head of *Strumous Ophthalmia*.

V. INFLAMMATION OF THE RETINA.

Simple idiopathic retinitis is comparatively a rare disease, at least in this country, although as a sympathetic affection it frequently occurs in the course of other ophthalmiæ, whether external or internal.

From the peculiar position of the retina, by which it is concealed from immediate observation, as well as from its functional importance, the symptoms by which we are enabled to recognise retinitis are chiefly of a physiological character. There is acute deep-seated pain in the globe extending to the eye-brow, great intolerance of light, and the appearance of shining spectra of various forms, with gradual diminution of the power of vision. The iris is motionless, and the pupil greatly contracted, while the whole globe is exceedingly sensible to the slightest touch or movement. All of these symptoms are frequently developed, before a dull general redness of the sclerotica makes its appearance. The disease is attended with great febrile excitement; and the excessive pain of the eye and head is frequently followed by delirium and other symptoms of phrenitis; for which indeed it may be mistaken, as the characteristic symptoms of the ophthalmia are not always very obvious. Acute retinitis is rapid in its progress, and tends, if neglected, to pass into general inflammation of the internal textures, accompanied with photopsia, chemosis of the conjunctiva, discolouration of the iris, deposition of coagulable lymph in the pupil, and finally purulent effusion into the anterior chamber, which may increase to such an extent as to cause rupture of the cornea, and destruction of the eyeball.

Chronic inflammation of the retina, or as it is vulgarly termed "weakness of sight," is an affection much more frequently to be met with than the acute form of the disease above described. It is characterised by intolerance of light varying in degree, imperfection of vision, the appearance of "*muscæ volitantes*," and other ocular spectra, and a sensation of dryness in the mucous membrane of the eyes and nostrils; by degrees the pupil becomes contracted, and the iris motionless. Morbid sensibility of the parts supplied by the fifth pair of nerves is sometimes observed to accompany this disease; thus the slightest touch in the neighbourhood of the eye is followed by pain of some duration.

Causes. Acute retinitis may be produced by sudden and vivid flashes of light, or by exposure to the continued influence of light and heat, as from large fires: hence it is frequently met with in cooks, and certain classes of artisans whose occupations necessarily subject them to these stimuli. Reflected light seems to be more pernicious to the retina than that which falls upon it directly from a luminous object; hence the deleterious effects of the glare from snow in northern regions, or from the burning sands of southern latitudes. Simple retinitis, however severe, does not usually pass into general inflammation of the globe unless from neglect, or when it occurs in individuals specially predisposed from some peculiarity of constitution, or accidental condition of the system.

The *chronic form* of the disease is generally observed in persons whose occupations require continued exercise of the eyes upon minute objects, whether

brightly or imperfectly illuminated *; for in either case the eye is overstrained, though the *modus operandi* of the exciting cause may be different. Thus watch-makers, tailors, milliners, engravers, printers, and those who fatigue their eyes much in reading and writing by artificial light, are frequently the subjects of this affection. Probably the constrained and stooping posture required in these and some other trades, may contribute to its occurrence, by inducing a congested condition of the vessels of the head. It is not unfrequently met with in those addicted to the excessive use of ardent spirits, and perhaps from the reason just mentioned. Onanism has also been assigned as a cause, whether justly or not we cannot say.

Diagnosis. Occurring in a chronic form it is very apt to puzzle the young practitioner, who is frequently misled by the patient's complaints of "weakness of sight," to apply stimulants when he ought to deplete. The history of the origin and progress of the complaint, taken in connexion with the temperament of the patient and his habits of life, will in general suffice to clear up the diagnosis. In all doubtful cases, great caution ought to be shown in the employment of stimuli, whether general or local.

Treatment. Copious bloodletting is to be employed, followed by the application of leeches round the eye in considerable numbers, till the inflammatory symptoms, are relieved. After clearing the bowels, calomel and opium should be given so as rapidly to affect the mouth. (See cases related by Mr. Lawrence, ch. xviii. of *Treatise*, p. 323.) The extract of belladonna ought to be smeared over the eyebrow, and perfect rest both of the body and of the eyes must be enjoined, with abstinence and the exclusion of light. Counter-irritation may be had recourse to after the employment of more effective remedies. If general inflammation of the globe takes place with suppuration, a poultice is to be applied; but the cornea is not to be opened while the contained pus is small in quantity, as it may possibly be absorbed under the combined influence of mercury and counter-irritation. Beer recommends the repeated application of the *vinum opii* to the eye in this condition, and states that under the use of this remedy, along with the exhibition of opium and sometimes cinchona, he has witnessed the complete disappearance of depositions of pus in the anterior chamber. Should the matter collect in such quantity as to fill the anterior chamber, or be accumulated at a greater distance from the surface, it must be evacuated by incising the cornea with an extraction knife, or by making a section of the sclerótica parallel to and a little behind the edge of the cornea. In these circumstances the natural appearance and structure of the eyeball are destroyed, and it becomes either flattened anteriorly or staphylomatous.

With regard to the treatment of retinitis in its *chronic* form,—avoiding the use of all stimulant applications, we must have recourse to moderate depletion by leeching, which may be repeated as the occasion demands, along with the exhibition of purgatives and the moderate use of mercury and counter-irritation. The eyes ought to be shaded from the light, and exposure to the exciting causes of the disease as much as possible avoided. Inattention to this last-named and apparently very obvious particular, either from neglect or necessity, is frequently an occasion of the protraction of the disease, despite of the most judicious treatment.

VI. INFLAMMATION OF THE CHOROID.

Inflammation of the choroid (*choroiditis*) is minutely described by Dr. Mackenzie as an independent disease, while Mr. Lawrence regards it rather as one link in a chain of morbid effects resulting from general inflammation of the internal tunics. Although the inflammatory action in its early stages may possibly be limited to the texture of the choroid, it speedily extends to the neighbouring tissues, producing various forms of disorganisation by which the disease is recognised rather than by any sign of vascular action.

* Tailors frequently complain of dark-coloured work as being especially injurious to the eyes.

One of the earliest objective symptoms is the formation of a blue zone round the cornea, of variable breadth and completeness, produced by thinning of the sclerotica, which is succeeded by the protrusion of small tumours of a dark bluish colour, and varying in number, size, and position. A watery effusion is gradually formed between the choroid and retina, producing absorption of the vitreous humour, and compressing the latter membrane into a cord-like substance, which simulates the appearance of deep-seated cataract or malignant tumour of the optic nerve.

Changes in the pupil are frequently observed, consisting in displacement, contraction or dilatation, and immobility, with narrowing of the iris towards the affected portion of choroid. The cornea presents opacities of various forms and degree; from which cause alone vision may be materially impaired.

Great enlargement of the globe sometimes succeeds to these changes, followed by inflammation and suppuration, or fungous growths, rendering the extirpation of the organ necessary. The disease is generally attended with considerable pain and intolerance of light, and the appearance of various morbid and optical phenomena referrible to the condition of the retina or the neighbouring tissues. In some cases these symptoms afford the earliest indications of the disease. Blindness may ensue before the disease has apparently made much progress; and on the other hand there may be enlargement and discoloration of the whole globe with tolerable vision. The constitutional symptoms are inconsiderable, especially in the early stages; but the digestive organs are frequently deranged from the first.

The *causes* of choroiditis are involved in much obscurity; those to which it has been referred are equally productive of other forms of ophthalmia. It is a disease of adult years, more frequent in females than in males, and in those of a strumous habit than the reverse. In children it occurs only as a consequence of injury.

The *treatment* consists in the employment of profuse and repeated blood-letting, both general and local, in the early stages, with the use of mercury, in the first instance as a purgative, and afterwards as an alterative. The continuance of the medicine till the mouth is affected, does not appear to be productive of any decided benefit. The warm bath will be found of much service, and tonics are sometimes productive of benefit after depletion. The arsenite of potass has been recommended as exerting a marked influence over several of the symptoms; it may be given in the dose of $\frac{1}{32}$ of a grain thrice daily, and gradually increased. Counter-irritation by means of the tartar-emetic eruption is useful. Puncture of the sclerotica and choroid to evacuate the contained fluid, may be resorted to when there is a tendency to choroid staphyloma; it generally relieves the sensation of tension and pressure in the eye, and may be repeated weekly, or at longer intervals. A choroid staphyloma sometimes requires to be removed, from the inconvenience occasioned by its size and prominence; the most projecting portion is generally cut away, and the rest of the eyeball left.

VII. INFLAMMATION OF THE LINING MEMBRANE OF THE AQUEOUS CHAMBER, AND OF THE LENS AND ITS CAPSULE.

These diseases having been described by different writers upon ophthalmology, demand only a passing notice. They are of rare occurrence, and the latter affection at least little amenable to treatment; they are consequently comparatively unimportant; and from the difficulties attending the diagnosis, they are not likely to be recognised, unless by those who have made the diseases of the eye a special object of study. It is therefore sufficient to refer to the works of Wardrop (*Morbid Anatomy of the Human Eye*, 2d edit. vol. ii. p. 6.), Mackenzie (*Practical Treatise*, 2d edit. p. 552.), and Walther (essay on *The Diseases of the Crystalline Lens, and the Formation of Cataract*, in his *Abhandlungen aus dem Gebiete der Praktischen Medicin*. Landshut, 1810), for a detailed account of these affections.

AMAUROSIS.

Definition. — *Idiopathic and symptomatic.* — *Symptoms.* — *Causes.* — *Diagnosis.* — *Prognosis.* — *Treatment.*

THE term Amaurosis (derived from *ἀμαυρόω*, to obscure or darken,) is applied to those diseases of the eye in which there is partial or complete loss of vision from impaired sensibility of the retina. It is synonymous with *gutta serena*, which has been given to the disease from the erroneous idea, that the enlarged pupil, which is often one of its symptoms, is a dark fluid that intercepts the rays of light: hence also the name *cataracta nigra*. Amblyopia (from *ἀμβλῦς*, dull; and *ὄψις*, vision) is applied to the slighter forms of the disease, in which, though objects can be seen, they are imperfectly distinguished. Some writers describe, as a complicated form of this disease, various structural changes of the internal textures of the globe, which ultimately affect the retina, and in which, therefore, impaired vision or total loss of sight occurs as a symptom; but we agree with Mr. Lawrence in deeming it better to limit the term amaurosis to the instances in which the disease has commenced in, and been originally confined to, the nervous structure. (*Treatise on the Dis. of the Eye*, p. 490.) Much confusion has been produced by the indiscriminate and inaccurate use of the terms functional and organic, which when thus opposed to each other, as if expressive of two distinct and essentially different conditions of disease, are far from conveying any clear or definite ideas. The following remarks of Mr. Lawrence upon this point are so pertinent, that we quote them at length: "The state of an organ necessary to the correct execution of its function, is a living not a dead condition; it requires not merely a certain organisation as we find it after death, but a supply of healthy blood in a certain quantity, a natural state of nervous influence and sympathy, and perhaps other circumstances not clearly understood. "If all these conditions are combined, can we consider it possible that the function should be disordered or interrupted? If one or more should be altered or wanting, can the disease be properly regarded as simply functional?" — "Since then the epithets organic and functional are indefinite, being employed in different senses by different persons; since they do not denote generally well ascertained and clearly understood conditions of parts; and since the situation of the nervous apparatus of sight renders it impossible for us to know its exact state in most instances, I consider this distinction of amaurosis to be of no practical utility, but from its vagueness rather calculated to mislead." (*Op. cit.*, p. 489-90.) While agreeing fully with these observations, we would not be misunderstood as denying the *principle* contained in the distinctions above referred to, however we may question the propriety of the mode in which it has been applied.

Looking at the amaurotic affections generally, two great classes into which they naturally divide themselves are clearly distinguishable, — viz. those dependent upon *primary* disease of some portion of the nervous apparatus of vision, as the retina, optic nerve or brain; and those arising *secondarily* and sympathetically from disease in other, and perhaps distant parts of the system. To the former of these classes, the name of the *idiopathic* may be given; to the latter, that of the *sympathetic* or *symptomatic*. We do not enter upon a consideration of the analogies or differences in the actual condition of the visual structures in these two classes of disease, inasmuch as such an attempt would be in a great measure conjectural, nor do we affirm that the line of demarcation can, in every case, be clearly drawn between them; but, generally speaking, they are sufficiently discriminated from each other by the differences in their symptoms, the nature of the prognosis which

they suggest, and the treatment which they demand. Dissociated from names which only tend to mislead, we consider the distinction to be of great practical utility, and propose to adopt it in the sequel of this paper.

With reference to its duration, Amaurosis has been divided into the incipient or recent, and the inveterate or confirmed. In degree, it may be partial or imperfect, and complete*; while in regard to persistence, it has been distinguished as continued and intermittent, the latter being periodical or irregular. Amaurosis is said to affect females more frequently than males, and dark-coloured eyes rather than the lighter shades. The disease may attack one or both eyes; in the former case, generally extending after a time to the other also; and in the latter instance, presenting differences in degree in each organ.

Symptoms. In detailing generally the symptoms, whether of idiopathic or sympathetic amaurosis, we shall arrange them under the heads of the *objective* and the *subjective*, or those which we recognise by the direct exercise of our senses, and those which we ascertain from the testimony of the patient. Each of these classes ought to be separately investigated, and if, as frequently happens, one eye exhibits differences in the character and progress of the disease from the other, the history of each must be individually considered. We notice the *objective symptoms* in the order in which they would probably engage the attention of a watchful observer. 1. The air and gait of an amaurotic patient is frequently peculiar. If the disease is imperfect, or even if complete, provided it is limited to one eye, the above-mentioned circumstances may not present any thing unusual; but when both eyes are affected, and vision is reduced to a mere perception of light and shadow, there is an uncertainty in the movements of the individual, and a vacancy in the expression of his countenance, which is altogether characteristic of the disease. 2. The eyeballs are frequently affected with oscillatory movements, or they are completely fixed, or from want of harmony in the action of the recti muscles, strabismus varying in form and degree is the consequence. The motions of the palpebræ also may be wholly suspended, or imperfectly or irregularly performed. The globe of the eye must be examined as to its colour, prominence, size, form, and consistence. The sclerotica seldom exhibits a healthy appearance, being either yellowish or of a leaden hue, or loaded with varicous vessels. The eye may be unusually prominent, hard, and tense, or sunk and atrophic, and soft and yielding to the touch; in these circumstances it is sometimes flattened on one or more sides by the pressure of the recti muscles. 3. The pupil may exhibit changes in its form, dimensions, position, and mobility; being irregular, dilated, or contracted, inclining towards some portion of the circumference of the iris, and either sluggish in its movements or completely fixed. In some instances, the pupil retains its natural mobility, although vision is much impaired or even wholly extinct; and in cases where one eye only is amaurotic, the movements of the iris in the sound organ are participated in by that of the diseased; hence the precaution recommended in such circumstances of closing the sound eye, while examining the condition of the other.† 4. The appearance and condition of the humours of the eye are points of much importance. They may exhibit changes in their transparency, indicated by the appearance behind the pupil of the greenish yellow opacity, termed *glaucoma*; or they may be altered in consistence, the globe feeling softer than natural, an effect which may result either from the partial absorption of its fluid contents, or from the breaking down of the membranous septa by means of which the figure and position of the vitreous humour is maintained. Changes in the deep-seated tissues, of a

* The term "complete" ought to be restricted to cases in which the patient has entirely lost the perception of light. It is not so, however, by all writers.

† Dr. Mackenzie has suggested, in explanation of this interesting phenomenon, the possibility, in such cases, of the brain or optic nerves being diseased posterior to the communication which takes place between the latter and the third pair, upon the maintenance of which, in its normal state, the motions of the iris depend. The theory appears to be highly plausible.

more marked and definite character, may also be exhibited.* 5. The marks of injuries about the head and face, whether old or recent, ought to be observed and inquired into, especially such as from their appearance and position were likely to affect directly or indirectly the superficial branches of the fifth pair of nerves, or any portion of the optic apparatus. 6. As amaurosis is not limited to any period of life, habit of body, or pursuit; the age, the general aspect, the physical and moral constitution, and the profession of the patient, ought to be carefully noted and inquired into, as tending to throw much light upon the causes of the disease, and the mode of treatment which it demands.

Subjective symptoms. Of these, the most prominent is the impaired vision, which presents every variety in degree and rate of progress, as well as in the periods and circumstances in which it occurs. It may be sudden and complete, or gradual in its development, slowly advancing to the entire destruction of sight, or remaining stationary after reaching a certain point. It may be constant, or occur at irregular intervals, or at certain fixed periods, assuming the form of hemeralopia or nyctalopia. It may come on without any assignable cause, or succeed to the continued exercise of the eyes upon minute objects. In some cases, the obscurity extends to the whole field of vision, while in others it is limited to a portion or portions; thus, in reading print, the patient either sees the whole page indistinctly, or he loses sight of a word or letter here and there. In other instances, one half only of any object is seen ("visus dimidiatus," "hemioptia"), or certain portions of it, or every object appears double ("visus duplicatus," "diplopia"). Some rare examples of double vision with one eye have been observed. Some patients see best whatever is situated obliquely to them; others what is directly in front: some can only distinguish objects which are at rest, others those which are in motion; or all objects are observed as if disfigured and distorted in various ways. In some instances, vision assumes a myopic, in others a presbyopic form. Some persons see best in dark and cloudy weather, others in bright sunshine. In some instances, vision is most perfect in the morning, after the rest of night, when the stomach is empty or the diet restricted; in others, it is much improved by taking food and stimulating drinks.

False impressions constitute an important item in this class of symptoms, and are either persistent or occasional. In appearance, they may be luminous or dark-coloured, and are either general over the field of vision, or limited to particular portions. Those of a bright colour are sometimes only perceptible to the patient when in the dark; in other instances, they are seen both during the day and night, assuming various forms, as of a sea of molten gold, or globes of fire or stars, which are either at rest or in motion, or they resemble flashes and sparks of fire which seem to dart from the eye. In some cases, all objects are seen as if bordered with prismatic colours, or the patient becomes unable to distinguish certain hues which formerly he could easily recognise. The dark-coloured phenomena appear in the form of a general cloud or network, or of specks apparently floating in the air, which are either solitary or numerous, and seem to rise and fall with the movements of the eye. Sometimes they resemble membranous films, or chains and coils, and numerous other figures equally diversified and fanciful.

The sensibility of the eye to light varies in different cases; generally it is much diminished, but in some instances it is greatly augmented, giving an unnatural clearness and brightness to surrounding objects (oxyopia), or causing so much pain and uneasiness that the patient is unable to bear the ordinary light of day.

A sensation of dryness in the mucous membrane of the eyes and nostrils is a not unfrequent attendant upon amaurosis.

* The dilatation of the pupil by means of belladonna, though not always practicable in cases of amaurosis, ought to be attempted, especially when it is accompanied with deep-seated opacity. The degree of susceptibility to its influence still retained by the iris is thereby exhibited; and if the pupil dilates, the nature of the opacity is of course more easily ascertained.

Pain limited to the eyes, or extending to the head and face, is observed in the majority of amaurotic cases. It may be constant, intermittent, or periodic. Its character, degree, and the extent over which it is felt, ought to be inquired into; also the circumstances which tend to relieve or aggravate it, whether accompanied with vertigo, tinnitus aurium, nausea, a disposition to sleep, or wakefulness. Dulness of one or more of the senses sometimes exists, with failure of memory, and inability to exert certain other of the intellectual faculties. The history of the patient's general health, and especially of any previous attacks of disease, ought to be made a particular subject of inquiry, as tending to unfold the causes which may have remotely and indirectly prepared the way for his present affection. Other points for investigation arising out of the peculiarities of each individual case, will readily suggest themselves to every reflecting mind.

Beer describes, under the name of "*Amaurotic Cat's-eye*," a peculiar and rare affection of the organ, attended with impaired vision, immobility of the iris, and an opalescent reflection from the pupil and bottom of the eye. Mr. Lawrence relates three cases of this disease (*Treatise*, p. 564-5.), all of which occurred in young persons, and states, that in his experience it has always proceeded to complete loss of sight. The appearance presented by the pupil renders it probable that the disease is dependent upon structural changes in the choroid and retina, with the precise nature of which we are still unacquainted. Dr. Mackenzie adverts to another condition of the eye, also attended with loss of sight, but differing from the former, in presenting an opaline reflection apparently from the anterior capsule of the lens. In one case affecting both eyes, at the patient's request he introduced a cataract needle through the cornea and pupil, but found no trace of the lens; a profuse discharge of watery fluid followed the puncture, and when the cornea healed, the glittering reflection was observed as before. (*Pract. Treat.*, p. 834.)

Causes. The *predisposing* causes of amaurosis do not differ essentially from those which may give rise to disease in any other texture of the eye or organ of the body. It has been observed, in some rare instances, to be congenital, and is hereditary more frequently than cataract, according to Beer, who mentions the case of a family in which it prevailed among the females, during three generations. (*Lehre von den Augen Krankheiten*, vol. ii. p. 442.) Whatever tends to depress and exhaust the vital powers may prove a predisposing cause of amaurosis; as chronic discharges of any kind, immoderate venery, or onanism, protracted lactation, the long-continued influence of depressing passions, inanition, and some poisons. Frequent and long-continued attacks of strumous ophthalmia in childhood have been observed to render the individual very liable to amaurosis in after years, from the influence of slight exciting causes. The period of life unquestionably exercises some influence in its production, for although occurring at all ages, it is more frequent in those of mature years, and has been remarked to occur especially about the period of the cessation of the catamenia in females, and the corresponding age in males.

Among the *direct* or *exciting* causes of amaurosis may be enumerated over-exertion of the eyes, or their protracted occupation upon minute objects, or exposure to bright light and intense heat; hence the frequency of the disease among certain classes of artizans, who are necessarily subjected to the influence of such stimuli. A single exposure to one or other of these causes has sufficed in some instances to produce loss of vision; but in general this result is gradually developed, appearing to flow from continued over-excitement of the organ. Injuries from mechanical violence, inflicted upon the retina, optic nerve, or brain; or diseases of these parts, whether consisting in simple congestion or a deficient supply of red blood, or in more serious structural changes*, either originating in these tissues themselves, or produced by the

* It was ingeniously conjectured by Mr. Ware, and has since been confirmed by observation, that dilatation of the anterior portion of the "circulus arteriosus," or of the central artery of the optic nerve, might sometimes be the cause of amaurosis. (See *Chir. Obs.*, vol. ii. p. 428. and Mackenzie's *Pract. Treatise*, pp. 946, 947.)

pressure of morbid growths in neighbouring textures are frequent causes of amaurosis in some of its most intractable forms. It may also originate from injuries done to the branches of the fifth pair of nerves, or even from mere irritation of these parts, as by a carious tooth*, &c. Violent mental emotions, the effects of lightning, and the rays of a tropical sun, may be mentioned as occasional causes. Amaurosis has also been ascribed to the cessation of inordinate or habitual secretions, and by some writers to the retrocession of eruptive diseases. Derangement of the hepatic system, or continued irritation of the stomach and intestinal canal, the existence of pregnancy, and some diseases of the puerperal state, are among the principal causes of amaurosis in its sympathetic forms. In conclusion of this part of the subject, it may be remarked, that amaurosis is rarely the effect of any single cause; most frequently it is traceable to the combined operation of several, differing perhaps widely from each other, and exerting their influence during a protracted period.

Diagnosis. Impaired vision, whether recent or of long standing, if unaccompanied with opacity in the cornea or behind the pupil, cannot be confounded with any other disease. To distinguish amaurosis from glaucoma is seldom required from the frequency with which they occur together, nor is it practically needful, as the same treatment is in general applicable to both. Amaurosis in its early stages, when combined with glaucoma, may be mistaken for incipient cataract, but the following points of difference will serve to distinguish them:—In glaucomatous amaurosis the opacity is of a greenish yellow hue, deep-seated, and surrounded apparently by a transparent circle, and most obvious on looking directly into the pupil. The opacity in cataract is of a milk and water tint, appearing immediately behind the pupil, by the margin of which it is bounded, and is equally visible in whatever direction the eye is examined. In posterior capsular cataract, the opacity is also deep-seated, and presents the concave surface frequently observed in glaucoma; but it differs from it in exhibiting striæ radiating from a central point, whereas the opacity in glaucoma is always uniform. In glaucomatous amaurosis the consistence of the eyeball is generally firmer than natural, a circumstance not observed in cataract. The progress of glaucomatous amaurosis is usually slow, both as regards the increase of opacity and the declension of vision; the latter symptom may indeed remain stationary for years. In cataract, vision declines rapidly, and always bears a fixed ratio to the amount of opacity. The pupil in glaucomatous amaurosis is generally sluggish, if not dilated and motionless; whereas in cataract it retains its natural mobility. Glaucomatous amaurosis is frequently preceded and accompanied by pain and various other uneasy sensations in the eye and head, and by derangement of the functions of other organs, as of the stomach and bowels: the motions of the palpebræ and of the globe may be imperfect or abnormal; there may be ptosis or strabismus, &c. The formation of cataract is not in general attended with any of these circumstances.† Other distinctions have been enumerated, derived from the nature and appearance of the optical phenomena which are visible to the patient, and from the circumstances and direction in which his vision is most perfect; but as they are not pathognomonic of either disease, they cannot be relied upon. Should the amaurosis be combined with cataract, the difficulty of the diagnosis is of course augmented; but a careful observation and comparison of the symptoms of each disease will in general suffice to establish it, and if not, the growing opacity of the lens will in due time render it evident.

* An interesting case of this kind is detailed in the *Arch. Gén. de Méd.*, tom. xxiii. p. 261., in which the amaurosis depended upon the irritation caused by a minute splinter of wood which had penetrated through the fang of a decayed tooth.

† In doubtful cases of this description we have employed the aid of artificial light to assist in determining the diagnosis, as ingeniously suggested by Professor Sanson, senior. It is certainly useful in furnishing negative evidence at least; for where the inverted image of the candle is observed, we may confidently affirm the non-existence of opacity in the posterior capsule of the lens, or in the layers of its substance immediately adjoining. For an account of this interesting phenomenon, and its application to diagnosis of opacities behind the pupil, see "Remarks on Lenticular Glaucoma," by Dr. Mackenzie in *London Med. Gaz.*, April 14. 1838.

In cases of amaurotic cat's-eye, the shining metallic appearance behind the pupil might possibly be mistaken for fungus hematodes. For the distinguishing circumstances, we must refer to descriptions of this disease given elsewhere. (See Lawrence's *Treatise*, p. 616.)

With regard to the discrimination of the different forms of amaurosis, a careful consideration of the history of each case and of the peculiar combination of symptoms which it presents, will in the majority of instances serve to distinguish the idiopathic from the sympathetic disease. No characteristic signs can be pointed out by which they may be certainly recognised. A similar remark may be applied to the diagnosis of amaurotic affections of an asthenic character, and those dependent upon incurable structural changes, the distinction between which, from its great practical importance, must by all means be made, although often beset with difficulties.

Prognosis. There are two points which, *primâ facie*, ought materially to influence our prognosis, viz. the duration of the disease, and the degree in which vision is impaired. Sudden attacks attended with urgent symptoms of disturbed vascular action, and whether accompanied by paralysis or not, are more favourable than those which come on gradually without any strongly marked indication, one amaurotic and paralytic symptom by degrees succeeding to another. By energetic measures, we may hope to relieve such cases as the former, while in the latter we have to fear the development of morbid growths, or other serious structural changes within the cranium. If the retina is quite insensible, the prognosis is certainly unfavourable, although cases are recorded, in which vision was restored after nearly total blindness of several days' duration. (Lawrence, *op. cit.*, p. 324, 325.) Should the insensibility continue without improvement during a few weeks, the case may be considered as hopeless. Great alteration in the size, form, and mobility of the pupil, with preternatural hardness or softness of the globe and glaucoma, is unfavourable, as indicating disease of the nervous apparatus of vision, or of the internal textures of the eye, which is probably incurable.

The prognosis is favourable in the sympathetic forms of amaurosis; as we may generally anticipate a return to the healthy condition of the function, where the disease upon which the impaired vision is dependent admits of alleviation or cure. In cases where one eye alone is affected, our prognosis must be extended to the healthy as well as to the diseased organ; for from the intimate sympathy existing between them, it rarely happens that one is attacked without the other participating in the affection at a period more or less remote. Hence active treatment must frequently be adopted and pursued, not as a curative, but as a preventive measure.

Treatment. Amaurosis being accompanied in a large majority of instances with symptoms of inflammation or congestion in the nervous apparatus of vision, antiphlogistic measures are frequently required, varying in kind and degree according to the age and constitution of the patient and the urgency of the indications. Referring to what has been already said in a former article, regarding the treatment of retinitis, which in an acute or chronic form is a fertile source of idiopathic amaurosis, it will suffice at present to observe that when the patient is young and plethoric and the inflammatory symptoms active, depletion, both local and general, must be practised, with the free exhibition of purgatives, and the employment of counter-irritation. Should these measures fail in producing the desired effect, recourse must be had to mercury, which from its influence in controlling inflammation in other textures, analogy would suggest, and practice confirms, as being equally useful in the present instance. Calomel and opium ought therefore to be given till the mouth is affected; and, generally speaking, the influence of this remedy upon the system ought to be maintained during several weeks, to insure all the benefit which it is capable of affording. If the antiphlogistic treatment and mercury equally fail, little more remains to be done: measures ought to be taken to promote the general health, the maintenance of which may possibly

operate beneficially upon the diminished powers of vision. The effect of counter-irritation, by means of a succession of blisters, may also be tried.

In cases of a more chronic character, occurring, as we every day witness, in combination with a debilitated constitution and disordered general health, such activity of treatment would be highly prejudicial. Topical bleeding however may still be requisite, the indications for which, as well as for general depletion in other instances, is to be derived, not from the condition of the system, but of the part. In such instances as the above, although mercury is to be employed chiefly as an alternative, considerable benefit is frequently derived from the continuance and gradual increase of the dose, till the mouth is slightly affected. The employment of counter-irritation must not be omitted; repose of the organ should be enjoined, and the use of tonics, both dietetical and medicinal, is often a useful auxiliary. In cases attended with symptoms of cerebral congestion of long standing, along with topical bleeding and the exhibition of purgatives, we have derived considerable benefit from the insertion of a seton in the neck. The amaurotic affections which we have termed sympathetic or symptomatic, being in general dependent upon a disordered condition of the stomach and bowels, arising from the presence of irritating matters or some other cause, whether temporary or permanent, the state of these organs must be especially attended to. The emetic and "resolvent"* plan, as proposed and practised by Richter, Schmucker, and Scarpa (*Pract. Obs. on Dis. of the Eye*, p. 486.), might be supposed to be peculiarly applicable in such circumstances; but Messrs. Lawrence and Travers, both of whom have given it a fair trial, concur in stating that they have never derived any benefit from its employment. The latter remarks (*Synopsis of the Dis. of the Eye*, p. 310.) that "the cases of gastric disorder to which it is especially applicable, are most benefited by a long-continued course of the blue pill, with gentle saline purgatives and bitter tonics." It must be admitted however, that many of the temporary amaurotic affections, especially of children, are speedily relieved, if not entirely removed, by an emetic, succeeded or not, as the case may require, by a few brisk purgatives.

Where amaurosis can be traced to general debility of the system, induced as is sometimes the case, by protracted lactation, or the abuse of other natural secretions, the indications of cure are so obvious, as to require no additional comment.

Various powerful stimuli have at different times been employed in the treatment of amaurosis, on the supposition that the disease might be dependent upon a diminished energy or want of tone in some portion of the nervous apparatus of vision. Of one and all of these remedies it may be affirmed, that their indiscriminate use has been productive of much evil, and that in the early stages of the disease, accompanied with symptoms of local inflammation, they are wholly inadmissible. Where no such objection exists, and the concurrent symptoms appear to indicate a condition of diminished nervous energy, we see no objection to a judicious trial of their powers, although the ill-success which, generally speaking, has hitherto attended the experiment, does not warrant us in building much upon their efficacy. Mr. Hey of Leeds (*Med. Obs. and Enq.*, vol. v.) and the late Mr. Ware (*op. cit.*, vol. ii. p. 409.) have related cases which sufficiently attest the occasional benefit of electricity; while Messrs. Travers (*op. cit.*, p. 309.) and Lawrence (*op. cit.*, p. 545.) concur in stating that they have never witnessed any good effect from its employment, or that of galvanism, although repeatedly tried in cases of a favourable description. Mr. Tyrrell's (*Cyc. of Pract. Surg.*, p. 105.) testimony is nearly to the same effect.

Strychnine has been much employed in the treatment of amaurosis since its first proposal by Dr. Shortt. (*Edin. Med. and Surg. Journ.*, vol. xxxiv.) The cases which he has published show very clearly the immediate benefit which may re-

* The "resolvent pills," which formed an important item in the scheme, consist of a farrago of drugs, and fifteen of them are directed to be taken three times a day for some weeks.

sult from its exhibition, while the doubts which he expresses as to the permanency of these effects, has been only too amply confirmed by the subsequent experience of others. Dr. Shortt recommends the strychnine in instances where the symptoms are apparently dependent upon simple want of power or atony of the nervous structure, or when a congested condition of the capillaries of the retina, unattended with vascular excitement, may be supposed to exist. In such circumstances, we should not hesitate to employ it after the failure of other and more certain remedies. The most efficacious mode of applying the remedy is to dust it upon a blistered surface, from which the cuticle has been removed, over the eyebrow or upon the temple; commencing with one sixth of a grain and increasing the quantity daily, till the constitution is sensibly affected, as indicated by headach, pricking pains over the body, or tremors, when it should be discontinued, and on resuming its use, the dose should always be considerably diminished. Mr. Tyrrell (*op. cit.*) observes, that he has made trial of strychnine in cases apparently the most appropriate for its use, and has prescribed the remedy in various ways, both internally and externally, continuing it till the involuntary muscular contractions were frightful; but without meeting with a single instance of benefit from its employment. Dr. Mackenzie (*op. cit.* p. 916.) states, that he has never witnessed any remarkable effect which could fairly be attributed to the strychnine. We have ourselves frequently made use of it, and still more frequently witnessed its employment in the practice of Mr. Morgan in Guy's Hospital; and we are unable to recall even one instance in which it proved *permanently* beneficial, although *temporary* improvement of vision to a remarkable degree was sometimes produced. The testimony of the above-mentioned authors, as being the most competent judges of the merits of this remedy, ought to deter the less experienced from its indiscriminate employment, and caution them against buoying up the unfortunate subjects of incurable amaurotic disease with hopes of returning vision, which are only destined to be cruelly disappointed.

Stimulating applications to the eyes and nostrils, in the form of vapours and snuffs, have been recommended; and from the sympathy which exists between the branches of the trigeminal nerve and the retina, they may possibly be of service in cases where a stimulus is required. On the same principle, a succession of small blisters to the neighbourhood of the orbit has been productive of benefit in some instances. Amaurosis succeeding to wounds of the frontal or other branches of the fifth pair of nerves, has been in some instances cured by a complete division of the injured twig; generally however the operation has failed to relieve. Belladonna, given internally or rubbed upon the surface, is sometimes productive of benefit in such cases, and they occasionally undergo a spontaneous improvement. We purposely abstain from mentioning many other remedies which have been proposed in the treatment of amaurosis, inasmuch as experience has demonstrated their total inefficacy.

INFLAMMATION OF THE EAR,

OR

OTITIS.

Definition of otitis and otorrhœa.—*Acute and chronic otitis.*—*Symptoms of acute external otitis*—*of acute internal otitis*—*of chronic otitis or otorrhœa.*
—*Causes.*—*Anatomical characters.*—*Diagnosis.*—*Prognosis.*—*Treatment of acute external otitis*—*of acute internal otitis*—*of chronic otitis.*

THE term Otitis (from *oûs*, ὠτὸς, the ear) is applied to inflammation of one or more of the parts which constitute the organs of hearing. From the pain

which frequently accompanies the disease, some writers denominate it *otalgia*, (from *ōs*, ὤς, and ἄλγος, pain), while, by most authors, the chronic form has been called *otorrhœa* (from *ōs*, ὤς, and ῥέω, to flow), on account of the discharge by which it is characterised.

This disease was very imperfectly described, before M. Itard gave an excellent account of it in his work (*Sur les Maladies des Oreilles, &c.*), published in 1821. The researches of Saunders, Abercrombie, and Pilcher, in England; of Lallemand, Andral, and Deleau, in France; and of P. Frank, Lincke, and Kramer, in Germany, have tended still further to clear up the obscurity in which it was formerly involved. These writers have shown that a knowledge of auric medicine can only be acquired by those who are acquainted with the general laws which regulate disease throughout the animal economy.

Otitis has been divided into the acute and chronic, the distinction being founded on its severity and duration. Acute otitis has been subdivided into the external and internal; the former including inflammation, more or less general, of the meatus auditorius externus and membrana tympani; the latter, inflammation of the tympanum and Eustachian tube.

Symptoms of Acute External Otitis. This form generally commences with an unpleasant sensation or slight pain in the auditory canal, resembling that occasioned by the presence of a foreign body in the ear; in other cases, it is of a burning or itching nature. This gradually increases, until there is acute, occasionally lancinating, pain, sometimes of a dull, heavy, dragging, and tearing character, increased on pressure; by the motions of the lower jaw, or by the contact of cold air and hot fluids. The hearing is confused or impaired, and accompanied by whistling, buzzing, ringing, or roaring sounds, intermittent or constant. The membrane lining the meatus is red, and generally more or less swollen. At a period varying from a few hours to three or four days from the commencement of these symptoms, a thin, limpid, or sanguinolent discharge, gradually becoming more consistent, and of a whitish, yellowish, or puriform appearance, takes place from the meatus. In some cases, Dr. Kramer has described the tumefaction of this stage to be so great as scarcely to permit a knitting needle to be introduced, and in other cases as affecting only one side of the meatus, forming a kind of elevation which extends irregularly along the cavity, and also affects the membrana tympani. The lining membrane is usually covered with pimples, filled either with a serous or purulent fluid; some of which having burst, leave ulcerations that continue to furnish the discharge, or crusts which more or less block up the cavity of the meatus. The discharge is occasionally inodorous, but more frequently fetid, and sometimes so acrid as to produce considerable irritation in the parts over which it flows. Granulations often form, resembling excrescences or polypi, of a soft, spongy, and very red appearance, and covered with a copious muco-purulent secretion: these granulations bleed from the slightest touch, but sometimes they have a broad base, are hard, insensible, of a pale red colour, and bleed little or not at all. In cases in which the membrana tympani appears to be primarily affected, it is more or less red, rough, swollen, and opaque, and sometimes covered with small projecting glands or follicles. Occasionally, also, bundles of vessels may be seen in it, and the point of the handle of the malleus cannot be distinguished. As the discharge becomes abundant, the pain usually decreases, unless the inflammation extend to the internal ear. The consistence of the matter discharged may undergo changes several times in the course of a week or even in a day. Sometimes it stops suddenly from the accumulation of crusts having caused a mechanical and temporary obstruction. As the inflammation declines, however, it often becomes thicker, and presents the colour, consistence, and even odour, of caseous matter. (*Itard.*) The discharge now gradually diminishes, and gives place to a more than usually abundant secretion of wax, sometimes accompanied by a serous exudation from behind the ear. Itard remarks, that now and then perforation of the cartilaginous portion of the external ear takes place, whereby a fistulous communication is established,

connecting the cavity of the meatus with the cellular substance which unites the cartilage and the bone. In two or three days, broad, dry, cuticular scales are thrown off, and a tenacious cerumen, of a bright or dark brown colour, is secreted, which is mixed up with cuticular scales, adhering firmly to the walls of the meatus, which is thus completely stopped up.

Acute internal otitis usually commences with acute deep-seated pain in the interior of either ear, rarely in both, accompanied by more or less general headach or hemicrania, rapidly increasing in severity, with whistling, clanging, loud, or beating metallic noises, and a sense of bursting or distension. Mastication and sudden noises or motions of the head augment the symptoms. The pain in the head may be violent, lancinating, or compressive, fixed or undefined. Some patients complain of insupportable heaviness in the head, and others think that the cranium will burst open. The pulse is hard and frequent, the skin hot, the countenance anxious, the eyes injected and sensible to light, the tongue furred, the taste vitiated, the appetite lost, with febrile excitement. At night, there is loss of sleep, great restlessness, sometimes delirium, and in children convulsions. Occasionally there is an unpleasant itching at the bottom of the throat, towards the orifice of the Eustachian tube, with swelling of the tonsils. An examination of the external ear exhibits nothing abnormal. These symptoms, if actively combated at the commencement, may, in two or three days, partially subside; the pain diminishes in intensity; the loud noises in the ear give way to violent hissing; the taste and appetite return; and the febrile symptoms gradually disappear. The hissing or buzzing noises with indistinct hearing usually continue three or four weeks.

But should the inflammation not thus terminate in resolution, perfect deafness is occasioned in the affected ear; the fever continues, and sometimes assumes a nervous or typhoid type, attended with much exhaustion; while the local inflammation gives rise to products which accumulate in the cavity of the tympanum, and at length force a passage towards the external surface. These products may be discharged, 1. by the meatus externus, from perforation of the membrana tympani; 2. into the throat, through the Eustachian tube; and, 3. through a fistulous opening in the mastoid process. The first is by far the most common, its frequency to that of the second, according to Itard, being ten to one.

The discharge of matter establishes, according to some authors, the *second stage* of the disease. When this takes place by perforation of the membrana tympani, it occurs suddenly, generally about a week after the commencement of the symptoms; a large quantity of matter being discharged, sometimes mixed with bloody streaks, as if an abscess had burst. The acute symptoms then generally diminish, and the patient experiences considerable relief, so long as the flow of matter is abundant and unimpeded. Sometimes, however, it is obstructed, either by its concreting and filling up the perforation in the membrana tympani,—by causing inflammation and tumefaction in the external meatus,—or by accumulating and getting incrustated in that part of the ear. In either case, the acute symptoms are likely to return, unless the obstruction is removed. A communication is now established between the posterior fauces and the external auditory passage, if, as is rarely the case, the Eustachian tube be not obstructed: This may be proved by causing the patient to expire forcibly while the mouth and nose are shut. By this act, bubbles of air, mixed with fluid, escape from the meatus; or if the flame of a candle be placed before the external passage, it receives an evident impulse.

When the matter is discharged through the Eustachian tube into the fauces, it may take place suddenly or gradually. In the former case, a sensation is felt as if an abscess in one of the tonsils had burst; there is sudden expectoration of a muco-puriform, or purulent matter, sometimes of a disagreeable taste, and recurring in smaller quantities at uncertain intervals. In the latter case, the accumulated matter is discharged into the throat in small quantities, and brought up in the form of thick, tenacious, and sometimes bloody sputa,

which is detached from the fauces with much difficulty, especially in the morning. Under such circumstances, the lining membrane of the Eustachian tube, by participating in the inflammation, may be partially obstructed. Not unfrequently, also, the discharge of matter by tickling and irritating the glottis, produces a very unpleasant cough, a symptom which may induce the superficial practitioner to overlook its real cause.

When the discharge takes place through a perforation in the mastoid process, it is an evidence of the inflammation having extended to the membrane lining the cells in that portion of the bone, and the formation of an abscess behind the ear. This is a rare termination of the acute otitis, and has been observed most frequently in those cases which supervene on the decline of acute affections. (*Itard.*) It usually degenerates into the chronic form of the disease, and will be described more particularly under that head.

The symptoms which follow the discharge of matter differ according to the morbid alterations which have occurred in the internal ear. Thus the hearing is either entirely lost, remains impaired, or is recovered, in proportion to the nature and extent of the morbid lesions to be afterwards noticed. The symptoms usually lose their severity before a month has elapsed, at the termination of which period, if they have not disappeared, the disease may usually be considered chronic, and otorrhœa is established. Sometimes, however, the symptoms increase in intensity—there are rigors, spasmodic phenomena, more or less marked, with greater or less rigidity of the muscular system; the restlessness and agitation at night continue, which, with delirium, at length appear during the day. There is sometimes more or less paralysis and coma, followed by death. Sometimes otorrhœa does not occur; the pain becomes apparently deep-seated; the patient is melancholy and dull, notices nothing, moves his head backwards and forwards, holding it between his hands, and at last falls into a comatose state, and dies.

Deleau and Kramer describe a form of internal otitis, which the latter considers to be occasioned by inflammation of the mucous membrane, as contradistinguished from that of the cellular tissue and periosteum. The lining membrane of the cavity of the tympanum being fibro-mucous, at once a mucous membrane and periosteum, it may be doubted how far this distinction is borne out by anatomy. Several facts, however, indicate that this membrane may be the seat of a peculiar inflammation, resembling the blennorrhœal of some other mucous membranes, in which the violent symptoms above described are absent, and the principal lesion consists in impaired hearing from accumulation in the cavity of the tympanum, and the patient complains of a sensation of fulness and heaviness in the ear without pain; the hearing is always more or less dull, and nothing can be discovered in the external auditory canal. The only signs of this lesion are drawn from various kinds of auscultatory phenomena produced by injecting air into the internal ear. These will be more fully noticed under the head of *Diagnosis*. These symptoms are generally subacute, but often become chronic, and Mr. Pilcher is of opinion that they not unfrequently lead to acute internal otitis. (*On the Ear*, p. 206.)

Inflammation of the internal ear may arise secondarily from the extension of disease in the Eustachian tube, from its lining membrane participating in the inflammation of the throat in angina, or from the extension of ulceration and other affections in the region of the throat. In this case, the patient may complain of momentary deafness, without its having been preceded by acute symptoms in the ear. This temporary deafness may be of longer or shorter duration, with intervals of perfect hearing. The patient sometimes hears his own voice worse than that of others, and occasionally has a crackling, gurgling, or detonating sensation in the throat leading to the ear. The blennorrhœal form of internal otitis, also, is very liable to be complicated with stricture of the Eustachian tube, occasioned by an acute or subacute inflammation of its lining membrane. In all such cases, a correct idea of the state of the parts is only to

be obtained by means of injections and catheterism through the guttural orifice of the tube, as recommended by Deleau, Kramer, and Pilcher.

Chronic otitis, usually termed *otorrhœa*, is often a termination of acute otitis, although it may also be a primary disease; and the discharge from the ear be established without pain, or other prominent symptom. This form of the disease is more frequently met with than the acute, and the long-continued escape of matter in many cases, without injuriously affecting the organs essential to life, is probably the principal reason why it has been regarded with so little attention.

Chronic, like acute otitis, may be confined to the external or internal ear. It rarely happens, however, if its progress be not checked, from whatever part the disease originally proceeds, that it does not sooner or later extend from the one to the other by perforation of the *membrana tympani*. Itard, and the generality of authors, have divided *otorrhœa* into the *mucous* and *purulent*, but that distinctions should not be drawn merely from the character of the discharge is further shown by recent microscopic observations, and more particularly from the researches of Haenle (*Über Eiter und Schleim*. Berlin, 1838.), who has demonstrated that it is utterly impossible to distinguish the fluids secreted from inflamed tissues into mucous and purulent. The point of real importance to determine is, whether the inflammation be confined to the membranes lining the auditory passages, or whether it be combined with caries of the bone, or complicated with lesions of the brain. With a view of directing attention more especially to these points, we shall consider chronic otitis as occurring, 1. with inflammation only of the membranes lining the various passages of the ear; 2. with caries of the bone; and, 3. with cerebral disease.

1. *Chronic otitis limited to the membranes* may be confined to the external ear, and be the result of acute otitis, or be induced by vegetations, thickening of the lining membrane, herpetic eruptions, or other chronic lesions of the lining membrane of the meatus externus. It is most common in children of a scrofulous constitution; apparently depends upon the general morbid affection inherent in the system, and disappears when this is removed by change of diet or residence, on the attainment of puberty, or by other circumstances which produce a radical change in the economy. The hearing is more or less impaired, according to the greater or less degree of obstruction in the meatus, either by the accumulation of matter, growth of vegetations, or thickening of the lining membrane of the meatus or *membrana tympani*. The matter itself varies in colour, odour, and consistence, in the course of the disease. The quantity discharged also varies at different times, although in general it bears a relation to the extent of the inflammation.

In the majority of cases, a perforation is made sooner or later in the *membrana tympani*, and thus the disease involves the internal ear. Under such circumstances, the hearing becomes more and more dull, according to the extent of the injury inflicted on the *membrana tympani* and chain of bones connected with it. No other marked symptoms, however, occur so long as there is no impediment to the flow of matter. Sometimes this is suddenly arrested, and then acute symptoms generally supervene; such as severe pain in the ear, fever, more or less violent headach, and other cerebral symptoms, which either disappear on the re-establishment of the discharge, or by their continuance prove destructive to life. Sometimes the suppression of the *otorrhœa* is followed by other disorders; such as affections of the eyes, porriginous eruptions on the scalp, swelling of the lymphatic glands of the neck, &c. Itard has once seen tumefaction of the testicle in a young man from this cause; Lallemand also has observed the *otorrhœa* alternate with accessions of rheumatism, catarrh of the bladder, leucorrhœa, &c.

The affection called by Roche *otite chronique sèche*, and by Pilcher *erythematic otitis*, and which has also been described by Mr. Earle (*Med. Chir. Trans.* vol. x.), is not, in our opinion, an inflammatory disease, but depends upon a per-

verted secretion of the lining membrane, which occasions a morbid deposit, similar to that formed in the *muquet* of French writers.

The duration of chronic otitis limited to the membranes varies infinitely; it may continue for many years without producing any serious result. In some very rare cases, the otorrhœa gradually diminishes, and at length wholly disappears, without producing any unpleasant result, but more frequently even this spontaneous cessation of the disease occasions a greater or less degree of deafness. This may arise from extensive lesions of the *membrana tympani*; thickening or stricture of the external meatus; loss of the tympanal bones, or complete obliteration of the external passage, from adhesion of its walls; in which case total loss of hearing is the invariable result. Even these terminations may be considered comparatively favourable, as in the majority of cases the discharge having accumulated more or less in the cavity of the tympanum, at length becomes acrid, induces ulceration and denudation of the membranes, and ultimately caries of the surrounding bone.

2. *Chronic otitis complicated with caries of bone* may be either the result of acute or chronic inflammation limited to the membranes, or it may, although more rarely, be the primary disease. In the external ear, it usually arises from inflammation of the periosteum, as pointed out by Kramer. A tumour forms towards the base of the external meatus, without pain or other inconvenience, except deafness to a greater or less extent. When the abscess opens, an ichorous, fetid fluid is discharged, the deafness is diminished, as long as the passage is clear. The discharge may thus continue for years, but if exfoliation take place the ulcerated part begins to heal, this process being accompanied by a great tendency to narrowing or obliteration of the meatus.

When the bones of the internal ear are diseased, the matter evacuated, instead of retaining the usual yellow colour and consistence of healthy pus, becomes thin, of a greyish or dirty colour, and more or less sanguinolent; it exhales a peculiar, sometimes very fetid odour, similar to that generated by carious bones, and frequently stains a silver probe of a brown or violet hue. Sometimes the acrimony of the discharge irritates the lobule of the ear and other parts with which it comes in contact, and occasions more or less swelling of those parts. As the disease advances, the discharge becomes mixed with small fragments of bone. In these cases, the patient feels a dull pain in the ear, which extends to a greater or less extent over the side of the head, with more or less impaired hearing. The mastoid process is the part most frequently affected; a dull pain, increased on pressure, being felt. In some cases, the skin which covers it becomes reddish, slightly swollen, and the seat of a purulent deposition or abscess, which is not accompanied by any acute pain. The skin subsequently becomes of a reddish brown or violet colour, more and more thin, and at length ulcerates, giving exit to the sanious discharge above described. A fistulous communication now exists between the external surface behind the ear and the cavity of the tympanum, through the mastoid process, the cellular structure of which is perforated, destroyed to a greater or less extent, and infiltrated with matter. On introducing a probe, the naked rough bone may be readily detected, and in several cases the instrument penetrates with facility into the mastoid cells, and even into the cavity of the tympanum. If the *membrana tympani* be ruptured, a fluid injected through the external opening escapes by the external meatus, and occasionally by the Eustachian tube. Sometimes the discharge from the fistula alternates with that from the auditory canal, or should it be suppressed, the phenomena formerly alluded to may be induced. Occasionally, the pus penetrates between the muscles attached to the mastoid process, and the abscess opens low down in the neck. Under such circumstances, it is very liable to be mistaken for an ordinary scrofulous tumour, and the ear affection to be overlooked. When, on the other hand, the caries of the mastoid process takes place with still greater slowness, its cellular structure becomes degenerated and broken down, and escapes through the meatus externus with the sanious discharge, while its rounded form gradually disappears, without the soft parts covering it being

affected : hence Lallemand considers it important, in all cases of chronic otitis, to compare the volume of the two mastoid processes.

Sometimes the matter collects in the mastoid cells, and after gradually excavating the bone at length finds its way through the Eustachian tube. In such cases, in addition to the dull pain, increased on pressing the mastoid process, there is a continual noise in the ear, resembling that made by a windmill, a waterfall, or unpleasant whistling, which deprives the patient of sleep. The hearing at length becomes more and more obscure, or is entirely lost, although in some cases it has returned, and again disappeared at intervals ; the noises also may increase or diminish in intensity ; these symptoms, together with the loss of hearing, apparently depending upon the mixture of air and pus in the Eustachian tube, and the plenitude or vacuity of this cavity. The patient has sometimes a bitter taste in the mouth, with nausea and vomiting. Occasionally, he is suddenly seized with cough, and expectorates a sanious purulent matter, mixed with bloody streaks ; a symptom which is very liable to appear in the morning. Whatever food is taken has a rauseous, disgusting taste ; the appetite is lost ; the patient becomes melancholic, emaciates, and loses strength every day. These symptoms are referable to the caries of the bone and the sanio-puriform discharge dropping into the fauces, although they have often been mistaken and attributed to some affection of the stomach or lungs. The caries however extends ; involves the other osseous parts of the organs of hearing ; perforates the dura mater, and affects the brain, even in some cases before its real nature is suspected.

The petrous portion of the temporal bone, which encloses the semicircular canals, is the portion next most likely to be affected ; and when this occurs, the destructive process is very liable to be communicated to the brain, giving rise to the symptoms to be presently described. Sometimes the caries follows the aqueduct of Fallopius, probably by the opening which gives passage to the chorda tympani, and then the patient experiences acute pains in the ear, spasmodic contractions of the muscles of the face on the side affected, terminating in paralysis. Lallemand has met with five cases of this kind, in which the phenomena were to be attributed to the facial nerve having participated in the structural disorganisation, and others are recorded by Bérard. The caries may also follow the aqueduct of the cochlea, and more rarely the internal auditory canal. It seldom happens, however, that when caries is once established, that its progress is limited to one direction. The same causes which occasions it in one situation may induce it in others, and hence the whole of the mastoid process and petrous portion may be destroyed. Lallemand cites a case from Beaugrand, in which the mastoid, coronoid, and styloid processes were destroyed by caries, as well as the glenoid cavity of the first vertebra, the odontoid process of the second, and the inferior part of the occipital bone. He says he has seen a similar case, in which the head was inclined on the shoulder of the affected side, with incomplete paralysis of the superior extremities, painful swelling of the neck, &c. (*Lettre iv. p. 222.*) The duration of chronic otitis with caries may vary from a few months to several years, during which period the symptoms may differ according to the passage by which the matter is discharged. This may take place in the same patient sometimes by the external meatus, sometimes by a fistulous opening, at others by the Eustachian tube giving rise to the different effects we have noticed.

3. *Chronic otitis complicated with cerebral disease* is analogous to the cerebral otorrhœa of M. Itard, which he divided into the primitive and consecutive ; the former, according to him, commencing in the brain and extending to the ear, while the latter commences in the ear and extends to the brain. The valuable researches of Lallemand, however, have made it very problematical whether the cases described by Itard and others as primary otorrhœa, are not in point of fact consecutive to chronic disease in the bone, in which the cerebral affection is the first circumstance which attracts the attention of the patient and practitioner. In all these cases, caries of the petrous portion of the temporal bone is found,

and it is evidently more likely that this should be the cause of the cerebral inflammation or abscess in its neighbourhood than that inflammation should have existed a long time without prominent symptoms, pus have slowly formed and produced perforation in the hardest and thickest of the cranial bones. It is worthy of remark, also, as rendering the latter opinion still more improbable, that while cerebral abscesses do not produce perforation in the softer bones which form the walls of the cranium, so they seldom communicate with the interior of the ear by means of the meatus auditorius internus. Whichever theory be adopted, it is important to know that the cerebral symptoms may occur previously to any discharge from, or other prominent symptom in, the ear, and, on the other hand, may supervene on chronic otitis of longer or shorter standing. In this sense, therefore, the terms primary and consecutive may be used. In either case, the symptoms are, obstinate headache, at first obtuse, afterwards lancinating and severe; sense of weight in the head; redness of the eyes; pain at the base of the orbit; sometimes convulsive contractions in the muscles of the face; tension or slight swelling of the scalp; sensation of constriction in the cranium, as if it were not large enough to contain the brain; sometimes lesions of the intellectual faculties, especially of the memory; hard and frequent pulse; loss of appetite; wakefulness, rigors, general fever, increased at night; furred tongue, fetid breath, increased wasting, general collapse, anxiety of the countenance, delirium, continual moaning, contracted or dilated pupils, strabismus, convulsions, rigidity of the muscular system or palsy, coma, and death. These symptoms, which vary according to the seat and intensity of the cerebral disease, are of the same nature, and follow the same progress, as inflammation of the brain and its membranes. When the discharge from the ear has preceded the cerebral symptoms enumerated above, it is generally diminished before they appear; when, on the other hand, they appear consecutively, the membrana tympani is sometimes ruptured, and a considerable quantity of matter escapes from the external meatus. Under such circumstances, the cerebral symptoms are for a time alleviated, and Itard has seen two cases which terminated in recovery after this occurrence. In the majority of instances however they return, and continue until the death of the patient. Sometimes, when cerebral disease supervenes on long-continued chronic otitis, the fatal event is more gradual; hectic fever supervenes, which by degrees destroys the constitution, and the individual sinks exhausted. It may also happen in otorrhœa accompanied by occasional headache, that muscular contractions or coma may come on suddenly, and either prove quickly fatal, or hemiplegia may be the result; in which case, an apoplectic attack generally sooner or later closes the scene.

Causes. Otitis has been observed rather more frequently before than after puberty, but both sexes appear equally liable to it. (*Lallemand.*) The causes which more especially predispose to the affection are a plethoric state of the body, or the scrofulous and gouty diathesis (*Kramer*); the period of dentition, the syphilitic poison, previous attacks, and diseases of the throat, pharynx, and œsophagus.

The disease may be excited by a rapid current of air acting on the head, or by exposing it uncovered to a cold atmosphere, especially during perspiration, or immediately after removal of the hair, imprudent bathing, the introduction of foreign bodies into the ear, injury of the external meatus by pricking or cutting instruments, caustic applications, stings of insects, irritating salves or drops, &c., the employment of galvanism or of electricity directed towards the ear for the cure of deafness (*Roche*); irritating injections into the auditory canal, the sudden disappearance of ophthalmia, the suppression of chronic discharges, the extension of scrofulous, syphilitic, herpetic, or porriginous diseases of the skin to the ear. It is likewise frequently one of the sequels of exanthematous fevers, more especially variola, erysipelas, and scarlatina, or of diseases of the throat and pharynx, &c. It has also been apparently occasioned by the irritation of carious teeth, cleft palate, congestive disorders of the brain,

and injuries of the head. It must however be stated that otitis has come on without any obvious exciting cause.

Anatomical Characters. At an early period of the disease, the lining membrane of the auditory passages is injected and reddened, and the vascular congestion most frequently causes in it a greater or less degree of tumefaction, producing more or less obliteration of the canal. Pimples are often seen covering the membrane; these are sometimes few in number but of large size; in other cases they are very small, resembling millet grains sprinkled over the walls of the meatus. The lining of the external meatus in some cases strongly resembles inflamed mucous membrane, the secretion covering it being similar in appearance to that furnished by inflamed mucous membrane in other parts of the body: hence the secretion presents different appearances, according to the intensity and character of the inflammation. These appearances, as stated by Kramer, vary according to the tissues principally affected; if the glandular structure of the investing integument of the external meatus be inflamed, the discharge is of a catarrhal nature; if it be the cellular tissue of this passage, the fluid is of a phlegmonous purulent character. Not unfrequently the inflammation in the lining membrane gives rise to unequal swelling of its structure, giving the appearance of excrescences or polypi; these are either soft, spongy, or of a bright red colour, vesicular, bleeding on every touch, sensitive, covered with a copious mucous secretion, pedunculated or globular; in other cases, they have a broad basis, almost as hard as cartilage, or even as bone; insensible, bleeding little or not at all, and rather of a pale red colour. (*Kramer.*) Occasionally, but more rarely, true abscesses form in the external meatus, sometimes giving issue to pure pus, or to a degenerated sanious discharge. In the latter case, inflammation of the periosteum has taken place, followed by caries in the neighbouring bone, as pointed out by Kramer; sometimes a membranous or albuminous exudation forms on the surface of the canal, similar to that observed in the mouth, and which has been described by the French under the name of *muguet*. Occasionally, the thickening of the membrane is so great as entirely to obstruct the canal; the obstruction has also been occasioned by a species of septum originating in elongation or diseased growth of the cutis, as in a case of Maunoir's quoted by Saunders; on the laceration of which, hearing returned. Obstruction of the canal is also very likely to follow the contraction of the ulcer after exfoliation of bone. The membrana tympani has been found wholly destroyed or more or less perforated and injured; it is not unfrequently opaque and thickened; sometimes as hard as cartilage. Saunders had a preparation in which half this membrane had been destroyed as far as the manubrium of the malleus, around which the cutis of the meatus had grown and joined the lining of the tympanum. (*On the Ear*, p. 69.) The lining membrane of the Eustachian tube undergoes similar alterations, producing stricture or obliteration; its calibre may also be lessened or obstructed, from being involved, or pressed upon, by different swellings or tumours in its neighbourhood.

The cartilages may also be affected, even in the acute form of the disease. Andral has found the cartilage of the external meatus softened and perforated in individuals who have laboured under otitis only fifteen days. Sometimes the perforation of the cartilage is produced from without inwards, by an abscess formed between the mastoid process, the angle of the jaw, and hollow of the ear. It has also followed suppuration in one of the parotids, the pus, first formed in the granular structure of the gland, finding its way into the external meatus by a fistula of its cartilaginous walls.

Lesion of the osseous structure is one of the most serious results of the disease. The tympanal bones are generally those which are first affected, and they either escape through the perforated membrana tympani, the articulations and membranes which connect them together being destroyed, or, as rarely occurs, they become ankylosed. In the former case, of the four tympanal bones, the two outermost, the malleus and the incus, or these with the orbicularis only, may be detached and expelled, while the stapes is left behind; or it may hap-

pen that the suppuration has affected the base of the stapes and the membrane connecting it to the fenestra ovalis. The vestibule is thus exposed, and the water it contains escapes. (*Ed. Med. and Surg. Journ.*, vol. xix. p. 92, 93.) The other osseous textures connected with the organs of hearing are the different portions of the temporal bone. The hollow parts of the bone are lined by a thin membrane, which is continuous, and thus inflammation in one part of it is liable to extend to the others: hence caries of the osseous structure follows certain directions, which bear a relation to the different canals that perforate it. The communication of the mastoid cells with the cavity of the tympanum is much more direct than with the labyrinth; and its soft structure, and the extent of membrane which traverses it, render this portion of the bone especially liable to disease. It is occasioned by the destruction of the thin periosteum, the denudation of the bone, followed by suppuration of its cellular tissue, while the matter is discharged in the various ways previously described. After having destroyed the mastoid cells, the caries often extends to the petrous portion of the bone, most frequently that part which contains the semicircular canals. The superior semicircular canal is separated from the cavity of the cranium by a very thin but compact plate of bone: hence the reason of the communication of the caries with the membranes of the brain being almost always at the superior and anterior surface of the bone, as remarked by Itard and Lallemand.

The morbid alterations found in the brain and its membranes are analogous to those described under INFLAMMATION OF THE BRAIN. The dura mater only may be diseased; in which case a portion, for the most part corresponding to a carious spot in the bone below it, is inflamed and thickened, or spongy, disorganised, or ulcerated, and in most cases detached from the bone. Occasionally, on lifting it from the petrous portion of the temporal, black spots are found on its external surface, which cover similar discolourations in the bone. This degeneration, and the other morbid changes just noticed, may be confined to the dura mater, or may have extended to the arachnoid, and involved, to a greater or less extent, the latter membrane. Pus is frequently found extravasated between the dura mater and bone, or between the former and the arachnoid membrane; sometimes there is effusion of false membrane in the latter situation: both these products have been occasionally found to extend more or less over the surface of the brain or cerebellum, or along the tentorium. Sometimes the alterations in the membranes are connected with softening or with an abscess in the brain, the latter not unfrequently encysted, and communicating with the cavities in the internal ear. Such alterations may or may not be more or less connected with injection of the cerebral substance, effusion of fluid into the ventricles or arachnoid cavity, and other signs of acute inflammation. Morgagni, Itard, Abercrombie, Lallemand, Brodie, O'Brien, Pilcher, and others, relate several cases where the cerebrum or cerebellum has been the seat of large abscesses, in some of which the matter was of a green colour and fetid odour.

Diagnosis. An accurate diagnosis of the various forms of otitis can only be arrived at by a careful inspection of the organ. The examination of the external ear is readily accomplished in its normal state, by inclining the patient's head to the opposite side, directing the ear to the sun or a strong light, and converting the curved passage of the meatus into a straight one, by drawing the auricle upwards and outwards, whilst the tragus is pressed outwards. When, however, the external ear is the seat of morbid changes, it will be necessary for this purpose to use a speculum, such as is recommended by Kramer, by which, with the aid of sun-light, or that reflected from a mirror, the membrana tympani and meatus may be minutely examined.

The examination of the internal ear, with a view to diagnosis, was practised by Sabatier, Wathen, Douglas, Saissy, Itard, and others, by means of metallic tubes introduced into the guttural orifice of the Eustachian tube, and injections of tepid water; the sensations thus produced formed the basis of diagnosis in several cases. Of late years, the mode of exploring the internal ear has been much improved by introducing air instead of water, the idea of which first

originated with Cleland, and has since been extensively practised by Deleau and Kramer. The latter authors, especially Deleau, have by these means applied with great success and ingenuity the principles of auscultation to the investigation of diseases of the internal ear. For the purpose of operating, Deleau recommends that an elastic catheter be introduced into the Eustachian tube, although Kramer considers that the usual inflexible metallic instrument in general use answers every purpose. The following are the directions for proceeding with the investigation given by Kramer, air having been previously compressed in an appropriate apparatus. "After the catheter has been introduced into the Eustachian tube, and fixed by means of the frontlet, the patient is placed close to a table, on which he leans the elbow next to it, and in this position he holds with the hand of that side the pipe of the air-press previously filled with compressed air. The operator then introduces the metal beak of the pipe into the funnel-shaped dilatation of the catheter; applies his ear close to that which is under examination; opens the cock of the machine; and listens to the sound made by the air rushing into the middle ear: when the Eustachian tube and cavity of the tympanum are perfectly free and open, the air flows in strokes without interruption, and with an audible shock against the membrana tympani. When the first shock of so strong a stream of air is over, or if it be not very violent, we hear, during the continuance of the streaming in of the air, a blowing and rustling in the ear of the patient, which appears to issue out of the auditory passage, and to fill his ear in its whole extent." The variations from this sound are morbid, and furnish indications, more or less distinct, of diseased changes in the organ, although, in order to judge of these correctly, it is necessary to pay attention to the force with which the air enters, and be somewhat skilful in the manipulation of the necessary instruments. Deleau has denominated these sounds *bruit de pluie*, *bruit de pavillon*, *bruit de la caisse*, &c., to distinguish which great experience is required. For a more particular account of them, however, we must refer to his work (*Mém. sur le Catheterisme de la Trompe d'Eustache*). If the air-douche does not penetrate into the cavity of the tympanum, it will be necessary to explore the Eustachian tube by means of catgut bougies. It is proper to state, however, that such modes of investigating diseases of an organ of such delicate and minute structure can be with safety undertaken by those only who are intimately acquainted with minute anatomy.

The different forms and varieties of otitis may for the most part be readily diagnosed by uniting the above means of investigation with a study of the symptoms presented by each. External is recognised from internal acute otitis—1. by ocular examination of the external meatus; when, in the former, the appearances previously described will be observed, while in the latter there is nothing abnormal; 2. by the discharge in the former occurring from three to thirty-six hours after the commencement of the symptoms, and increasing gradually, while in the latter, it seldom appears before the sixth day, and then takes place suddenly from the external auditory canal, or either suddenly or gradually into the throat.

When describing external otitis, we gave the diagnostic signs which, according to Kramer, distinguish the different kinds of inflammation from each other. Primary inflammation of the membrana tympani may be distinguished in the acute stage by the red, swollen, and opaque appearance it presents; and at a later period by its being thickened, perforated, and giving rise to a purulent discharge, or being more or less covered with fungous excrescences. It may be known from internal otitis by the above appearances at the commencement of the disease, and the milder nature of the symptoms. Kramer is of opinion that this primary inflammation of the membrana tympani constitutes the disorder generally termed ear-ach, and has been mistaken for pure nervous otalgia. Mr. Pilcher also points out the importance of distinguishing inflammation of this membrane, as the introduction of opium and other narcotics, which will benefit pure neuralgia, will here increase the excitement (p. 178.).

it is only to be detected by examination. The blennorrhœal inflammation of the internal ear is to be distinguished from the other varieties of otitis by dullness of hearing, without pain or any discharge from the external meatus, and the presence of a gurgling mucous noise (*bruit muqueur*) on the introduction of the air-douche into the cavity of the tympanum. Inflammation of the lining membrane of the Eustachian tube may be suspected from the occurrence of deafness to a greater or less extent, with irritations in the throat, without pain in the ear, unless it be complicated with some of the other varieties of the disease. It can only be positively diagnosed by using the catheter, which will also determine the amount of constriction or obliteration in the tube.

In the chronic form of the disease, it is important to determine whether the membranes alone are affected, or whether the bones are also involved. In the former case, the matter is of a yellowish purulent appearance, more or less abundant, and of greater or less consistence; in the latter it is always thin, greyish, or of a dirty colour, more or less sanguinolent, staining a silver probe, and exhaling a peculiar odour, generally denominated *carious*. It is also sometimes mixed with small bony fragments, the irregular form, and rough surfaces of which, render them easily distinguishable from the small bones of the ear. In some cases, examination of the external canal will enable the practitioner to see the denuded bone.

It is of great importance, with a view to prognosis, to determine whether the stapes is present or absent, which can only be done with certainty when the membrana tympani is absent. This is not easy, "on account of the obliquity of the cavity, and of the little bone presenting only its small head, being deeply seated, and thrown into shade by the projecting promontory. A little glistening spot may, however, generally be recognised above the anterior part of the promontory, which is the head of the ossiculum, whereas, were it absent, a dark spot would occupy that point." (*Pilcher*, p. 273.)

Caries of the mastoid process may be suspected when, in conjunction with the peculiar discharge, there is a fixed dull pain in that portion of the temporal bone, increased on pressure. When a fistula exists, examination with a probe will remove all doubt.

It is important to distinguish the congestive symptomatic cephalalgia, occurring in the course of otitis supervening on the suppression of the discharge, from the headach and cerebral symptoms symptomatic of inflammation of the brain or its membranes, either primary or consecutive. This is only to be effected by inquiring carefully into the history of the case. In the former, there is deep-seated throbbing pain in the middle of one side of the head, with great tenderness of the scalp; in the latter, there is a sense of constriction, without tenderness of the scalp, while the fever, delirium, injection of the face and conjunctiva, are more intense than in the former, and the increase of the symptoms at night, and exacerbations, are not so well marked. It must be remembered, also, that inflammation is more liable to occur in conjunction with caries of the bone, than when otitis is limited to the membranes. On the whole, however, it must be confessed that the diagnosis is by no means easy at the commencement, although at a later period, should there be convulsions, paralysis, rigidity, or coma, it will be comparatively less difficult. The symptomatic headach from otitis may be distinguished from the other varieties of cephalalgia by the severe pains in the ear, and the violent noises which are heard in the affected organ; symptoms which are increased on mastication and sudden noises. The fever, restlessness, and delirium, if present, are always increased at night. Irritation in the throat, and swelling of the tonsils, combined with the above signs, will throw further light upon the diagnosis. In all cases, the ear and throat should be carefully examined, as otherwise, from the ignorance of the patient and his friends of the connexion between the head affection and local disease, the latter may be entirely overlooked, and a line of treatment adopted which will increase rather than diminish the affection.

Prognosis. All discharges from the ear, more especially if chronic, should

be looked upon in a very serious light, inasmuch as they not only tend to destroy the sense of hearing, but are liable to induce structural alterations in the brain and its membranes. The opinion we may form of the disease, therefore, will have reference to two points; first, the influence it may produce on the sense of hearing; secondly, the greater or less amount of danger, as regards the life of the patient.

The prognosis, as to the curability or alleviation of the deafness, which may exist to a greater or less extent, will be derived from the history of the case, examination of the organ, and the symptoms which indicate in a negative manner that the disease has not extended to the tympano-vestibular membrane and the labyrinth. Examination of the external ear, by the means previously detailed, will determine whether the deafness depends upon some mechanical obstruction in the auditory passages, or upon the destruction of those parts essentially concerned in the function of hearing. In the first case, the prognosis will be favourable, if the obstruction be caused by the accumulation of pus, wax, crusts, &c., or growths which are susceptible of being removed or perforated; and unfavourable, when incurable strictures, or callous cartilaginous growths have permanently diminished or obstructed the calibre of the external meatus or Eustachian tube. In the second case, the practitioner must endeavour to ascertain whether any or all of the tympanal bones have been discharged. If the stapes still adheres to the membrane of the fenestra ovalis, hearing may be only impaired, from a deficiency in the conducting apparatus, and sonorous vibrations may still be conveyed distinctly to the labyrinth, by the solid parts of the head. If the stapes, however, have come away, it is probable that the vestibule is laid open, the sac eroded, and the water it contains in a healthy state has escaped. This is attended with irreparable deafness in the organ, as the nervous apparatus necessary to receive the impressions of sounds, and conveying the influence they produce to the brain, will then be so injured as to have lost its function. In the former case, the ticking of a watch is distinctly heard when placed between the teeth, and there is every reason to assure the patient that much may be done to improve his condition by a judicious treatment. When the labyrinth, and consequently the sentient part of the organ, has been destroyed, it is better to inform the patient at once that the deafness is incurable, than to make vain attempts to ameliorate his situation.

Treatment of Acute External Otitis. The local means necessary in this variety of the disease are for the most part such only as are capable of removing irritation from the external canal; as the application of poultices and the injection of tepid and emollient fluids. For this purpose, Kramer recommends a syringe three inches long, which contains an ounce and a half of water, and is furnished, anteriorly, with a pipe three quarters of an inch long, having an opening wide enough to give passage to a strong stream of water. The introduction of other substances into the meatus, as camphor wrapped up in cotton, recommended by Itard, or narcotic tinctures and preparations, as advised by some other authors, are more injurious than beneficial. Should the external meatus feel hot and burning, with swelling of its lining membrane, warm fomentations should be assiduously applied to the ear and side of the head affected, and at the same time a number of leeches behind the auricle. This treatment should be combined with the administration of purgatives, antimonial, pediluvia, and antiphlogistic remedies, which should be employed with greater or less activity, according to the severity of the symptoms. Derivatives may also be applied to the nape of the neck or behind the ear. With this view, Kramer much prefers the tartar-emetic ointment rubbed on the mastoid process to blisters, which he thinks are only useful in circumscribed inflammations of the meatus or membrana tympani. If there is much redness in the auditory passage, without vesicles, or if the membrana tympani be the chief seat of the inflammation, Kramer recommends injections containing the acetate of lead; and for this purpose uses a solution varying from one to ten grains of the salt to an ounce of water, which should be used two or three times a

day. If there be great swelling, and redness of the external meatus, with fever (*phlegmonous inflammation* of Kramer), endeavours must be made by general or local bleeding, and other suitable antiphlogistic remedies, with a rigorous diet, to induce resolution. Should these not succeed, however, and an abscess form, its suppuration must be favoured as much as possible by warm emollient poultices, applied night and day, until the tumour bursts; and they should be persisted in, combined with warm fomentations and injections, if the pain continue. If the discharge at a subsequent period become offensive or fetid, a few drops of pyroligneous acid or of chloride of lime to an ounce of water is to be employed as a lotion.

As soon as the first acute symptoms have subsided, the attention of the practitioner should be directed to the removal of the cause of the disease. If it depend on the extension of porriginous, herpetic, or exanthematous affections, the remedies applicable to the cure of the original diseases should be employed and perseveringly continued, in conjunction with the local means above described. Fungous growths should be removed,—if possible, torn wholly from their attachments, and the bases touched with caustic, care being taken, however, that this does not occasion too much irritation. When the excrescences in the ear are hard, with a broad base, Kramer has found incisions and cauteries useless, and considers them incurable. When insects enter the canal, a little fresh olive oil is to be dropped in, for the purpose of killing them, after which they may be easily washed out, or removed by the forceps. When foreign bodies have got into the ear, they must be removed by appropriate surgical means, care having been first taken to subdue the inflammation, if it have proceeded so far as to render the canal too sensitive to bear the contact of any instrument.

As the disease becomes more chronic, and all fever and local pain disappear, slight astringent injections may be used, and their strength cautiously increased, in the manner to be described in the treatment of chronic otitis. In all cases, however, these should be immediately suppressed if they induce the slightest irritation, or threaten a return of the disorder. Our chief reliance must at this period be placed on improving the general functions, especially those of the stomach and bowels, change of air, and such means as promote the healthy action of the different organs in the economy.

2. *Treatment of Acute Internal Otitis.* The acute internal otitis requires more active treatment than the external form; general depletion should be employed to a greater extent, so as to make a marked impression on the system. It will be generally necessary to employ afterwards cupping or the repeated application of leeches behind the ear, should the local pain continue. At the same time, an active purgative should be administered, and after its operation, antimonials every three or four hours, so as to keep up a state of nausea, and prevent a return of the general excitement. These remedies, if employed at an early period, will generally afford considerable abatement of the symptoms. Indeed, a large general bleeding alone has been often known to cut short the disease. On the second or third day after this treatment has been pursued, should the acute symptoms be evidently diminished, a blister may be applied behind the ear or at the nape of the neck. But should these means from having been employed too late, or from other causes, not induce resolution of the acute symptoms at the end of four or five days, and the sufferings of the patient be undiminished; if there be throbbing pain, with a bursting sensation in the ear, general headach and delirium, we may infer that suppuration has taken place. Under such circumstances, ulceration will for the most part take place spontaneously in the membrana tympani, and the discharge of matter will in most cases be immediately followed by considerable relief. Should this not occur, however, before the sixth or seventh day, it is desirable that the membrana tympani should be punctured, as the long confinement of matter in the cavity, mixed more or less with air, may, from its being insinuated into the mastoid cells, give rise to caries, or at all events induce a spontaneous la-

eration of the membrana tympani, that may be highly injurious. The evacuation of the matter, whether spontaneous or artificial, should be immediately followed by the injection of tepid fluids, in order to favour its discharge. The practitioner should then be careful in preventing any obstruction to its free exit by the use of tepid and emollient injections two or three times a day. The patient, also, should be directed to sleep on the affected side of the head, in order that the matter may not accumulate in the cavity of the external or internal ear. In all cases, the throat should be examined, and if there is swelling or irritation in the tonsils or posterior fauces, gargles, containing the suborate of soda, the nitrate of potass, or the hydrochlorate of ammonia, should be used; or such as are more astringent, formed of the decoction and tincture of bark, muriatic acid, &c. These gargles should be employed in such a manner as to strike with violence the affected part, in order to remove, as much as possible, any concreted matter which may adhere to the throat, and obstruct the extremity of the Eustachian tube. Itard recommends that the vapour of warm water should be inspired and expired with force, while the mouth and nostrils are shut. It is rare, however, that by such means obstruction is overcome; recourse must therefore be had to aqueous injections, as advised by Saissy, Itard, and others. The air-douche is preferred and practised by Deleau and Kramer. Should these not succeed, catheterism, performed by a skilful operator, may be attempted; and if the tube be found completely closed from disease, further efforts will tend rather to increase than diminish the evil. It will be proper, also, that such general measures as are calculated to assist in removing the disease be at the same time adopted. Itard speaks favourably of sternutatories, but their utility is very questionable, and if the patient is liable to headachs, they are dangerous. As the affection becomes chronic, the remedies, to be advised under that form of the disease are to be employed.

With a view of relieving the blennorrhœal form of internal otitis, recourse must be had to the air-douche. If a small mucous rale is heard on applying the ear to that of the patient, during the streaming in of the air, followed by a material improvement in the power of hearing, which is readily ascertained by the watch, it should be used daily; and if the mucous rale changes to a gurgling sound, and the patient's hearing becomes more distinct after each sitting, there is every hope of curing the disease. Should no sound be heard, however, or no improvement in the sense of hearing take place after the fourth sitting, Kramer lays it down as a rule that the attempt should not be persisted in. Injection of fluids, as warm water, or a saline solution, has also been employed, but those in general are not so beneficial as the air douche. In this variety of the disease, also, catheterism of the Eustachian tube may be often necessary.

3. *Treatment of Chronic Otitis.* The difficulty of curing chronic otitis will be in proportion to the length of time it has been established, and the amount of destruction produced in the membranous or osseous structures of the organs of hearing. Before commencing the treatment, the practitioner should pay considerable attention in all cases to the appearance of the discharge, and examine with care the external auditory canal, the parts surrounding the concha, the region of the mastoid process, and the interior of the mouth, soft palate, and amygdalæ. In all endeavours, moreover, to cure or alleviate the disease, it should never be forgotten that, when the malady has existed some time, the system becomes habituated to the discharge, and that, in proportion as the disease assumes a more chronic character, the greater is the danger from hastily suppressing it. In cases of long standing, the utmost caution is necessary to avoid the serious complaints that are apt to follow when the discharge suddenly lessens or disappears.

The *general* treatment is of great consequence, and should be steadily continued, in order to place the system generally in such a state as to favour the action of local remedies. If the affection have been induced or be kept up by chronic eruptions in the neighbourhood of the ear, the use of

warm or medicated baths, change of air, the internal exhibition of sulphur, mercurials, antimonials, sarsaparilla, and other alteratives should be employed. When the disease is connected with a syphilitic taint, the line of treatment necessary for treating the original affection should be adopted. When it is connected with scrofula, the preparations of iodine, such as the ioduret of iron, or the proto-ioduret of mercury, may be used alone, or in combination with the infusion or decoction of cinchona, or preparations containing quinine, tartarised iron, and other tonics. In some cases, it is of importance, by a nutritious diet, combined with exercise, judiciously regulated, to prevent the quantity of the discharge from producing a depressing effect on the system, while precautions should be taken to prevent the head, ears, or feet, from being exposed to cold, or changes of temperature. At the same time, vinous and spirituous liquors should be abstained from, and all stimulating articles of diet that may prove a source of irritation to the digestive organs carefully avoided.

The *local* treatment should be at first confined merely to the introduction of tepid water injections, until the practitioner, after a use of the remedies above mentioned, is assured of the general good state of the patient's health. This treatment should be persisted in for some time, at least four or five months in cases of old standing; although, when the disease is comparatively recent, the treatment by injections, to be noticed immediately, may be at once adopted. If there is a spongy condition of the external meatus, tents of lint, dipped in a solution of the acetate of lead, may be introduced into the passage, as recommended by Kramer, the pressure of which is useful in producing a disappearance of the excrescences. Should the discharge at any time become considerably diminished, or cease suddenly, every effort should be made to induce its return, especially should it be followed by cerebral or other serious symptoms. For this purpose, warm fomentations to the ear, and hot poultices, should be applied. Itard recommends the application of a loaf which has just left the oven, the crust on the side which is applied to the ear having been previously cut off. These means will in the majority of instances succeed. If, after the adoption of general treatment for some months, with the use of emollient injections once or twice a day, the discharge remain stationary, and especially if it have gradually diminished without any previous acute symptoms, the practitioner may proceed to lessen the discharge, and cure the chronic morbid action by resorting to a more active local treatment. Itard recommends that this should be accomplished with great caution, a maxim that in our opinion it is of the greatest consequence to attend to, as an attempt to hurry the cure, and induce a too sudden diminution of the discharge, may not only induce metastasis, but delay the recovery, and render it again necessary to go through a preparatory treatment. In several cases which have come under our observation, where this advice was not sufficiently attended to, we have seen acute symptoms come on, which in some were followed by caries, and the worst effects of the disease. We have observed also, that not a few patients labouring under otorrhœa have attributed their most serious complaints to the application of a blister or seton. On the other hand, when the medical attendant considers that attempts to check the discharge, and diminish the morbid action producing it, may be tried without danger, he should exchange the tepid and emollient injections for those which are astringent in the mildest degree, and such as are more and more powerful should be successively and cautiously used. A weak and tepid infusion of chamomile flowers or rose leaves should be employed to commence with, and continued several weeks, and the strength of these may then be gradually increased, rather than have recourse to stronger astringents. After a time such injections may be used cold, and subsequently a weak solution of the sulphate of zinc, or acetate of lead, may be employed, and its strength increased by degrees. Solutions of alum and nitrate of silver may also be employed. Months, however, should be occupied in this treatment, and the greatest care taken not to hurry on the cure, either from impatience on the part of the patient, or want of resolution on that of the practitioner.

Whenever the discharge diminishes too abruptly, the astringent injections should be for a time suspended; and should it cease suddenly, care must be taken to solicit its return by the methods previously mentioned, more especially if there should be the slightest threatening of acute symptoms. When this has been difficult, Itard has succeeded in one case by the use of the warm bath for three hours, and in another by applying a large cupping glass, so as to embrace all the concha and external ear. If at the end of five or six months, the discharge has nearly ceased, and the patient suffers from no unpleasant symptoms, a small blister behind the ear or at the nape of the neck may be employed, and in a few days replaced by a larger one. At this period of the treatment we have found derivatives useful in completing the cure. Injections may be introduced not only through the external meatus, but through the Eustachian tube. When the practitioner, however, has not been accustomed to this mode of operating, he had better inject by the former opening, as otherwise he is very likely to bring on acute symptoms.

If by the means now recommended the discharge should after a time permanently cease, a little cotton should be worn in the ear for a short time, in order that the parts may recover their tone. This must be worn continually if total deafness be the result of the disease; but if this be only partial, and the membrana tympani is not wholly destroyed, recourse may be had to such mechanical contrivances as are best suited to assist audition. If on the other hand the disease proves inveterate, and no benefit is derived from astringent injections, combined with appropriate general treatment, the efforts of the practitioner must be directed to keeping the parts clean, and favouring the discharge by emollient and simple injections. By attention on the part of the patient, although the disease cannot be cured, its destructive progress and termination in caries may be prevented. Dr. Burne alludes to the case of a woman seventy years of age, who had been affected with otorrhœa from both ears, and deafness, since she had the scarlet fever in childhood, and who by the daily injection of warm water had preserved the organs from further disorganisation. (*Cyc. Pract. Med.*)

We have laid great stress on the necessity, in chronic otitis, of acting cautiously and slowly, especially when it extends to the tympanum, being convinced that many of the inveterate cases met with in practice result from the ill-directed and hasty efforts made to effect a speedy cure of the disease by the injudicious use of too astringent injections, and the early employment of blisters, setons, &c.

In otitis with caries the same general treatment is to be followed as has been described, more particular attention being given to support the strength by tonics, antiseptics, and a nutritious diet. Should the discharge issue from the external meatus the same tepid and emollient injections should be frequently used, and every thing that obstructs the escape of matter carefully removed. If the matter is fetid, or of a disagreeable odour, a few drops of pyrolignous acid or chloride of lime, in an ounce of water, used as an injection, will correct it. A probe should be cautiously introduced, and if loose pieces of bone are felt slightly attached, their separation should be favoured as much as possible by slight pressure with the instrument, or if they can be reached with the forceps, extracted without force. When caries affects the external meatus, and the diseased bone exfoliates, the healing of the ulcer is very liable to be followed by obliteration of the passage. Kramer recommends that when the parts show a tendency to close, touching the edges with lunar caustic is the best means of keeping them open. If the parts are already closed, they should be opened by incision, and the caustic employed to prevent re-adhesion. Hearing however usually remains more or less dull, partly because the natural form of the meatus is lost, and partly because the membrana tympani has participated in the inflammation. If a dull fixed pain have existed some time in the mastoid process, and the skin covering it become swoln and discoloured, we should not wait and allow an abscess to form, whereby much time is lost, and the caries

rendered more extensive, but cut down on the bone at once, enlarge any small opening that may exist in it, so as to permit the free escape of matter, and inject directly tepid water into the cells of the mastoid process. An opening even may be made in the bone, by a proper instrument, if the operator is convinced of the presence of matter in the mastoid cells. When however the matter points in the neck above the clavicle, the abscess should not be opened, as by so doing a troublesome fistula would be produced, and there would be no means of acting directly on the diseased part. In these cases we should use as early as possible such means as are most likely to cause absorption in the abscess, and by the methods previously detailed endeavour to promote a free discharge from the external meatus. The caries of the petrous portion of the bone can only be treated by emollient injections, until the diseased portion of the bone separates. To promote this, an appropriate general treatment is of great importance, in addition to which Itard directs frictions on the scalp, the head to be shaved and covered constantly with a gummed silk cap. Subsequently astringent injections may be employed as formerly noticed: some authors have recommended irritating and even caustic injections into the external meatus, to favour the separation of the carious bone, but Kramer, with whose experience our own coincides, states that they should be avoided.

When there is any evidence that the disease has extended to the cavity of the cranium, absolute rest is necessary, and none but the mildest injections should be employed to favour the flow of matter from the ear. If the patient be of good strength, and the symptoms of cerebral inflammation be well pronounced, active bloodletting and antiphlogistics are indicated. Purgatives are especially useful in this case, both as a means of removing irritation from the alimentary canal, and from their acting as a derivative. We have already alluded to the difficulty of distinguishing such cases, and they are often very embarrassing to the practitioner. If, as is very likely to happen, he is called in to treat the cerebral symptoms, he may overlook the local disease, and use depleting measures to an extent, that may afterwards when the discharge returns, or becomes established, prove dangerous from having too much exhausted the powers of the patient. Dr. Burne states that he was once called in to a case that had been viewed and treated as idiopathic phrenitis, when he discovered a large abscess presenting behind the ear; it was opened and discharged a quantity of most offensive pus. The patient was relieved, but she sunk from the copious bloodlettings that had been practised. (*Cyclop. of Pract. Med.*) More generally however this unfortunate termination of the disease supervenes on a long-standing otitis with caries, when the patient is more or less enfeebled by the continued discharge, or by the local irritation having for a length of time acted on a constitution originally scrofulous or delicate. Under such circumstances the cerebral disease must be combated by derivatives, such as blisters or the tartar-emetic ointment applied to the scalp or nape of the neck, while the excretions are to be properly regulated, and tonics, a nutritious diet, and such means employed as may support the sinking powers of the patient.

END OF THE SECOND VOLUME.

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